Teachers' Perceptions of Educational Games that Keep Score of Cooperative Performances

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Abstract

The scoring systems used in traditional sports and games are founded on the zero-sum premise that players are on opposite sides and one side can win only if the other side loses. These scoring systems may be effective at nurturing zero-sum mindsets and providing data for assessing performance in win-lose relationships. If so, games that use different scoring systems can be used to facilitate the development of collaborative mindsets, nurture win-win skills between diverse groups, and enable objective self-assessment of performances in non-zero-sum events when engaging with those on "other sides." Although economic game theory has rich reservoirs of research regarding non-zero-sum games, educators do not commonly make use of game-theory concepts in designing educational games in a format that teachers can use to measure the individual performance of a student when learning together with others in a group. This study presents non-zero-sum games and scoring methods that have been used in teachers' classrooms, and then analyzes teachers' perceptions of the effects on students' character and academic performance that teachers attribute to the games. The study uses qualitative research with semi-structured interviews and thematic analysis. The results show that teachers discern gains in academic achievement and character development when students learn together using games that keep score of cooperative performances. Teachers also identified challenges in using these games and recommended improvements. It is hoped that future work on games that quantify collaboration between different sides will increase the number of productive and peaceful relationships in classrooms and in communities.

Keywords: educational games, competition, cooperation, scoring, feedback, reflection

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Chapter 1: Keeping Score of Cooperative Performance

The purpose of the following research is to learn whether educators perceive that teaching academic subjects with games that keep score of cooperative performances between students facilitates character development and boosts academic achievement.

One premise of this study is that children can benefit if they develop mental models of cooperation that are at least as robust as their mental models of competition because skills in cooperation can empower individuals to collaborate with a wide variety of people who perceive they come from "different sides" such as diverse cultures, faiths, classes, races, or other potential sources of alienation.

A second premise is that the culture taught to children through experiential education in sports and games could be one way to improve the understanding, motivation, and skills needed to cooperate with diverse groups of people.

A third premise is that experiential education using sports and games is more efficient if the structure of the games and the scoring systems are consistent with the learning objectives that experiential education seeks to achieve for the children and the society. Specifically, before this type of experiential education can be efficient at promoting collaboration among different sides, the game structure must involve collaboration between different sides and the scoring systems must quantify cooperative performances between different sides.

None of these premises denies the value of skills developed by win-lose contests. For example, win-lose skills are essential for a political candidate who hopes to win an election. Nor are win-win skills always appropriate. For example, a win-win relationship

between police and criminals is called corruption. The point of this research is to explore the merits of providing balanced experiential education for children with both win-win events and win-lose events and multiple opportunities to reflect on both paradigms.

Problem statement. Currently, most children experience winning in games only when the other side loses. Adults seldom give children experience winning by both sides working together to improve their scores through collaboration between teams or between individuals, but adults give children abundant experience scoring win-lose contests. None of the scored games commonly taught to children keep score in any way other than win-lose. Therefore, popular culture is unbalanced because young people are given numerous experiences working against the other side and keeping score on a win-lose basis, but adults rarely teach children games that involve collaboration with the other side and keeping score on a win-win basis. Few adults are aware that playing sports and games that keep score of goals achieved by collaboration between different sides can be engaging, challenging, and enjoyable. Furthermore, such games can develop skills that are essential to productive and peaceful relationships.

Research plan. This study explores the possibility that teachers perceive that certain types of games can strengthen character education and improve academic achievement by nurturing win-win relationships among students. The hope is that this study will shed light on ways teachers can educate students to keep score of their ability to collaborate with other students as they overcome challenges – both academic challenges and interpersonal challenges – that could increase their success as students and citizens in school and beyond school.

The research plan begins with the following steps of exploration:

1. Define vocabulary pertinent to games that keep score of cooperative performances between different sides. This includes an examination of the concepts of winning and losing.
2. Distinguish between cooperation and competition. Social interdependence theory identifies the essential difference between these two types of relationships.
3. Examine the application of this distinction between competition and cooperation in the form of education known as cooperative learning. This examination will expose a puzzle: cooperative learning is an effective pedagogy, but it is not used as frequently as would be optimal. Why not? Is there any relationship between the reluctance to use cooperative learning and the cultural imbalance caused by scoring sports and games exclusively on a win-lose basis?
4. Explore whether it is possible to keep score on a win-win basis. Alternative scoring systems can be found in game theory, but the alternatives need to be structured for use on athletic fields and in classrooms. Also, game theory addresses neither the cultural imbalance nor the puzzle about the underutilization of cooperative learning. While game theory liberates thought to countenance alternative scoring structures, other elements are essential for experiential education that is moral and that develops skills needed to build productive and peaceful relationships.
5. Seek essential resources from theories and research regarding social perspective taking, feedback, reflection, and moral reasoning. These areas of study reveal aspects of interrelationships among diverse people that are essential elements for

adults to grasp when they lead games designed to promote productivity and peacemaking.

These five steps lead to the introduction of an experiential-education system known as EnTeam games and to two research questions that are presented at the end of this chapter. Chapter 2 explains how the research questions are addressed by presenting an intervention plan and a research process for interviewing teachers who have used EnTeam games in their classrooms with their students. Chapter 3 reports on the data produced from the implementation of the research process. Chapter 4 discusses the findings from the interviews and returns to the puzzle about cooperative learning and the question of balance in the cultures created by the scoring systems used in sports and games.

Since the process of measuring cooperative performances is not a common practice, an introduction to the score-keeping process used in the system of educational activities offered by EnTeam games is provided in Appendix A. The EnTeam scoring process and EnTeam games are the outgrowth of persistently asking questions about when, where, and how children learn to measure the improvement in their capacity to accomplish goals in collaboration with diverse people.

Definition of Terms Pertinent to Scoring Cooperative Performances

"Children's games constitute the most admirable social institutions." With this sentence Jean Piaget opens his seminal work *The Moral Judgement of the Child* (Piaget, 1965 translation of 1932 French original, p. 1) in which he uses games as a social-research laboratory for identifying and analyzing the stages of moral judgments in children. Although his work is over 80 years old, Piaget's practice of using games – and

even many of his conclusions – are still useful to researchers studying character education and moral development through games (Gummerum, Keller, Takezawa, & Mata, 2014; McDevitt & Ormrod, 2004). For example, one study of the use of games asserts that research in psychological development would be strengthened by greater use of games as a context for understanding moral development and moral behavior (Gummerum, Hanoch, & Keller, 2008).

Before accepting the premise that one can use games as a pedagogical framework for fostering academic achievement or as a context for developing character and the capacity to build relationships that bridge between divided cultures or classes, definitions and essential concepts must be explored. These terms include *experiential education, character education*, *moral education*, *competition, cooperation, winning,* and *losing*. With an understanding of these terms, it becomes possible to construct a conceptual framework for comparing the cultures produced by games that keep score in different ways – win-lose and win-win. This framework leads to research questions that can be answered by interviewing teachers who have experience with alternative forms of winning and losing in games. Studying teachers' perceptions could lay groundwork for further research on the effects produced by alternative forms of sports and games.

The term *experiential education* refers to learning derived from doing an activity – including playing a sport or game – and reflecting on that experience. The *Association for Experiential Education* defines experiential education as "a philosophy that informs many methodologies in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills, clarify values, and develop people's capacity to contribute to their communities" (2017). The

reflection process is essential to learning according to this philosophy (Dewey, 1938; Garris, Ahlers, & Driskell, 2002; Luckner & Nadler, 1997).

The term *character* refers to positive qualities of thought, motivation, and behavior. An individual who is deficient in character is one who is thoughtless, malicious, or destructive toward people or their rights. Berkowitz and Bier provide a complementary definition of character as "…the set of psychological characteristics that motivate and enable an individual to function as a competent moral agent" (2013, p. 6).

Character education refers to activities and experiences that lead to *character development* which is the mental and moral capacity to make choices that are grounded on positive principles of wisdom, compassion, accuracy, and goodness (Althof & Berkowitz, 2006; Berkowitz & Bier, 2013; Berkowitz, 2011, 2012; Liu, 2014; Tolman & Beland, 2003). The opposite of character education is any learning experience in or out of school that leads to beliefs, desires, or behavior that are demeaning to people, disrespectful of their rights, deceptive, or immoral. Tolman and Beland define character education in schools as the "…development of core ethical values, such as caring, respect, honesty, fairness, and responsibility, in all members of the school community" (2003, p. 3). Lickona and Davidson make a distinction between *moral character* and *performance character* as different aspects of character and define the former as consisting of qualities such as integrity, respect, caring, and justice whereas the latter includes qualities such as persistence, hard work, and loyalty that may be used for either moral or immoral purposes (Lickona & Davidson, 2005). Berkowitz (2012) refines this distinction between moral character and performance character by prioritizing moral character as more crucial to the wellbeing of schools and society than performance

character because performance character can be used to enhance the achievement of immoral objectives such as demonstrated by Nazi efficiency.

Moral education includes a broad array of learning experiences intentionally constructed and designed to achieve beneficial objectives in the thinking, motivation, and behavior of students when they must make choices in situations involving justice, equality, and compassion (Althof & Berkowitz, 2006; Berkowitz, 2011; Berkowitz, 2012; Keller & Edelstein, 1991; Kohlberg & Hersh, 1977; Nucci, 2001; Schreiber, Cash, & Hughes, 2011). Althof and Berkowitz note that "moral education focuses on the development of justice reasoning, and, insofar as it incorporates more recent work on relational morality, reasoning about interpersonal care" (2006, p. 499). One part of their definition of moral education is "the attempt to promote the development of children's and adolescents' moral cognitive structures (moral reasoning stages) in school settings" (2006, p. 496).

Moral reasoning is the capacity to apply principles from moral education when confronted with dilemmas that arise in life experiences. Kohlberg and Hersh wrote, "Given that people have the psychological capacity to progress to higher (and therefore more adequate) stages of moral reasoning, the aim of education ought to be the personal development of students toward more complex ways of reasoning" (1977, p.55). One especially relevant aspect of moral education is the development of moral reasoning regarding deception and withholding information. If one person withholds essential information or presents information in such a way as to mislead others into believing something contrary to what the first person knows to be true, then the first person might be deemed untrustworthy, and cooperation between these individuals could become

problematic. A distinction between deception that is expected (as in sports where players strive to deceive as part of the game) and unexpected deception is discussed below beginning on page 47.

Education literature sometimes treats moral education and character education as synonymous terms, however character education includes areas of behavior that are not included in moral education: "Character education, because it takes a very broad approach, often blurs the line between moral concepts and other non-moral but related concepts" (Althof & Berkowitz, 2006, p.500).

Games include a continuum of diverse activities ranging in form from unstructured, purposeless diversions to highly structured simulations of life with enforced rules, defined roles, and scoring mechanisms for measuring performance (Caillois, 1961; Epstein, 2015; Garris et al., 2002; Kreps, 1990). Various taxonomies of games have been developed, and a brief exploration of the terms *games* and *play* is presented in Appendix F.

Game theory is a system of ideas (also known as *economic game theory* and *decision theory*) that facilitate the study of behavior in situations in which the actions of one individual impact the choices available to another individual (Kreps, 1990). Game theory uses the term *game* more broadly than is common. One salient feature of game theory is that it facilitates the measurement of cooperative performance. Game theory is explained further beginning on page 30.

The subset of games most relevant for this study is defined by the author as *scored games;* these include any activity that meets all the following conditions:

- The activity is an aspect of life or simulates an abstraction of an aspect of life.

- Two or more people are involved as players.
- Rules define how the activity is to be played.
- Players are free to make choices within the context of the rules.
- The players strive to achieve one or more goals.
- The players compete against an opponent or strive to overcome a challenge.
- Observers and the players can see and count how often the players achieve a goal.

Notice that this definition of scored games does not say that the opponent or challenge must be other players nor does it state that goals must be contrary or oppositional. The utility of this definition is that it facilitates comparison of games that keep score in two different ways:

(1) the type of game that is the subject of the present research study and

(2) more familiar games commonly taught to children on athletic fields, in spelling bees, chess matches, and other win-lose contests.

The essential point for the present research is that the scoring systems in some games pit players against one another; these are called *win-lose games*. The scoring systems in some other games pit players against problems; these are herein called *win-win games* and include a range of physical sports, table games, and academic games. Examples of win-win games are presented in Appendix A; the definition is expanded below and applied in Chapter 2.

Winning and losing. Among the many aspects of character development that Piaget examined through games, one that is especially relevant to this research is the children's conceptions of interpersonal relationships in the context of winning and losing

games (Piaget, 1965). It is in this context that the research on the scoring systems used in games pertains to the education of children including both character education and academic education.

The moral aspect of character education pertinent to this research is the impact on students' understanding, motivation, and behavior regarding principle-based choices when interpersonal issues arise during games – and outside of games. For example, some relevant issues of moral character after teachers use cooperative games include questions such as:

- Do teachers see less cheating than they see ordinarily?
- Do teachers see more compassion between students?
- Do teachers observe students engaging in deeper reflection on the ethical aspects of choices that they face in school and in life?

For the present research, win-lose games and win-win games are defined as follows:

1. In win-lose games, goal attainment is oppositional – goal attainment by one side is at the expense of the other side.
    - The scoreboard records the goal attainment and shows which side is winning and which side (or sides) is losing. If one side wins, the other side must lose.
    - In win-lose games between individuals, one person cannot win unless another person loses.
    - In win-lose team games, one team cannot win unless the other team loses.

- In popular culture, most sports and games that keep score are win-lose games.
- Most sports and games currently taught to children are in this first category.

2. In win-win games, goal attainment is mutually beneficial. Goal attainment by one side enhances the chances that the other side will attain their goal because they have goals that are mutually compatible, although not necessarily identical.
    - The scoreboard for win-win games shows whether both sides achieve their goals. Examples of win-win scoreboards are in Appendix A.
    - If one side wins, the other side must also win; if one side loses, the other side must also lose.
    - The full name of these games could be *win-win or lose-lose games*, but that moniker is unwieldy.
    - Few games of this type are currently taught to children. EnTeam games are in this second category of games in which different sides win together or lose together depending on whether they can improve their performance in a collaborative activity.

More on this distinction between win-lose relationships and win-win relationships is presented below in the discussion of negative interdependence and positive interdependence in the section of the literature review devoted to social interdependence theory (beginning on page 21) and in Table 4 Contrast between win-lose and win-win (shown on page 80).

The term *educational games* as used in this research includes a subset of scored games that illuminate some aspect of curricular content while engaging students in keeping score of their performance in attaining goals while doing activities designed to deepen understanding of the subject matter and build higher-order thinking skills such as analysis, synthesis, and evaluation (Garris et al., 2002; Wohlfarth, 2002).

Competition, an essential component of scored games, is a term defined in a multitude of ways. Some psychologists define competition as a social-comparison process that people use to categorize one another by identifying who is better, stronger, faster, smarter, richer, or otherwise superior relative to other people (Dweck, 1986; Garcia, Tor, & Schiff, 2013; Tajfel, 1982). Economists define competition as a market system in which the number of sellers is large enough to prevent any one seller from manipulating the price that buyers must pay for a good or service (Makowski & Ostroy, 2001; Stigler, 1957). Biologists define competition in terms of the genetic selection process that requires no cognitive thought process in the sense that psychologists use the term (Frank, 2009; Skyrms, 2009; West, El Mouden, & Gardner, 2011). Game theorists offer definitions of competition that include a *zero-sum scoring system* in which the benefits one side gains are offset by equal losses suffered by the other side; they also note that in some cases (including examples central to the present research) competition may involve *non-zero-sum scoring* where the total gains for both sides may exceed the losses or the losses may exceed the gains (Kreps, 1990; Osborne, 2003; Stevens, 2008).

Because of the diverse definitions of competition, scholars deconstruct the concept to illuminate their various fields of study. For example, in the area of character education and sports, Shields and Bredemeier use a unique pair of definitions to

discriminate between healthy approaches to win-lose events and the types of destructive rivalry manifest in malicious and hurtful approaches to sports contests by defining the former as *true competition* and the latter as *decompetition* (Shields & Bredemeier, 2009, 2011; Shields & Bredemeier, 2011; Shields, Funk, & Bredemeier, 2015). Central to their approach is the concept of *contest* involving different sides contesting or vying to score goals and keeping score on a win-lose basis. Shields and Bredemeier developed contesting theory to distinguish between two mindsets or conceptual metaphors. The first conceptual metaphor is contest-as-partnership in which the participants strive with their opponents to test and build their talents and capabilities. The second conceptual metaphor is contest-as-war and is the essence of decompetition: "When using this [second] metaphor, the contesting process is understood as one of 'striving against,' and the opponent is rendered as an enemy who stands between the athlete and his or her goals" (Shields et al., 2015, p. 2). By defining competition precisely, Shields and Bredemeier have been able to construct a process for testing their contesting theory and analyzing alternative mindsets on the moral character of participants in sports. More on the concept of true competition is relevant to the section of the literature review on scoring cooperative performance below (see page 37).

For the present research, competition is defined as a social relationship between players striving to attain goals that are measurable. People who score more goals than their comparison group are identified as the *winners*. People who score fewer goals than their comparison group are identified as the *losers*.

The comparison groups in competition with one another can measure attainment of mutually exclusive goals. In this case, the players are opponents in a win-lose contest, and the side with the better score wins.

Alternatively, the comparison groups participating in a competition can measure their attainment of mutually complementary goals if their goals can only be achieved when players work together to score points collaboratively on a win-win basis while striving to solve a problem or overcome a challenge. This latter conceptualization of competition is not standard, but it is central to the present research – and may facilitate relationships whenever the objective is to increase the level of collaboration among diverse groups of people. The concept of win-win competition may be especially relevant when the goal is to create productivity and peacemaking between groups that have been in conflict.

This definition of competition is the last component of the first step of the research plan. The definitions above provide the language needed to proceed to step two in the research plan: make a specific distinction between cooperation and competition. Therefore, the next section of this literature review takes the second step toward rebalancing the skew toward win-lose games by examining the first of two core theories on competition and cooperation: social interdependence theory.

Cooperation and Competition in Games and in Life

Conceptualizations of competition and cooperation are developed thoroughly – but differently – in two bodies of literature: social interdependence theory and economic game theory. Social interdependence theory provides a theoretical foundation for

cooperative learning and a basis for using games that keep score of cooperative performance in the classroom. Economic game theory provides procedures for measuring cooperation and competition. Both bodies of literature are fundamental to the present research. Social interdependence theory is presented in the following section. Economic game theory is presented beginning on page 30 after introducing cooperative learning.

Social interdependence theory. Morton Deutsch published research from his doctoral dissertation on social interdependence theory shortly after WWII and subsequently developed a prolific community of thinkers focused on conflict resolution and peacemaking based on the contrasted concepts of positive interdependence, negative interdependence, and independence (Deutsch, 1949, 1977, 2011, Johnson & Johnson, 2013, 2005). The foundation for Deutsch's work is Gestalt psychology, which developed in the early 1900's in Berlin, and subsequent work by Kurt Lewin, a founder of social psychology (the study of the manner in which the personality, attitudes, motivations, and behavior of the individual influence and are influenced by social groups) (Johnson & Johnson, 2013). Deutsch defined competition and cooperation using the concept of goal attainment and categorized all human interactions into three forms of relationship (Coleman, 2011):

1. Positive interdependence exists when there is a positive correlation among individuals' goal attainments; individuals perceive that they can obtain their goals if and only if the other individuals with whom they are cooperatively linked attain their goals.
2. Negative interdependence exists when there is a negative correlation among individuals' goal achievement; individuals perceive that they can obtain their goals if

and only if the other individuals with whom they are competitively linked fail to obtain their goals.

3. Independence exists when there is no correlation among individuals' goal achievement; individuals perceive that the achievement of their goals is unrelated to the goal achievement of others.

This taxonomy of human relationships is relevant to studying teachers' perceptions of the use of games because the taxonomy reveals an omission inherent in the scoring process of most sports and games: the only aspect of interrelationships between players from different teams that is explicitly measured by the scores on traditional scoreboards is negative interdependence because the games are structured as win-lose contests.

An alternative scoring system developed by the author is used in EnTeam games and is described in Appendix A. The EnTeam scoring process aligns with Deutsch's conception of positive interdependence and focuses attention on the collaborative efforts of the players. The point of attention is on positive interdependence rather than negative interdependence. The objective for EnTeam games is to balance the realm of physical and mental activities to include games that quantify on the scoreboard how well one team (or individual) does when collaborating with other teams (or individuals) in helping each other achieve mutually-compatible goals (Wohlfarth, 2002).

The way that players perceive their interdependence determines how they interact and the interaction pattern determines the scores that the players achieve (Deutsch, 1949; Garris et al., 2002). This perception of goals frames the concept of measuring cooperative

performance, for as Einstein is reputed to have said, "our theories determine what we measure" (Senge, 1990, p. 175).

According to social interdependence theory, the essential ingredients for cooperative situations include mutual assistance, exchange of needed resources, and trust (Johnson & Johnson, 2005). Competition tends to create obstruction of one another's success, coercion and threats, attempts to accentuate interpersonal differences, deceptive communication, and the general attempt to dominate or to outperform one another (Coleman, 2011). It is interesting to note that while advocating for positive interdependence, the advocates for social interdependence theory sometimes slip into the mindset of negative interdependence by juxtaposing the two approaches as adversarial rather than acknowledging both as potentially meritorious (Wohlfarth, 2010). For example, competition is beneficial and essential in democratic elections if the electorate is to have an informed choice about the differences in the candidates. Competition is essential in law enforcement if the public is to be protected from the mafia and malicious computer hackers.

Social interdependence theory provides the foundation for step three in the research plan: examine the application of this distinction between competition and cooperation in the form of education known as cooperative learning. This examination will expose a puzzle: cooperative learning is an effective pedagogy that is not used as frequently as would be optimal. Why not? Is the reluctance to use cooperative learning related to a cultural imbalance caused by scoring games exclusively on a win-lose basis?

Cooperative Learning

Cooperative learning is a significant pedagogy that is highly effective when used with fidelity to the five elements listed below (Johnson & Johnson, 2013), but often confused with group work (Abrami, Poulsen, & Chambers, 2004). Cooperative learning is the pedagogical basis for using EnTeam games in the classroom (Wohlfarth, 2002).

Cooperative learning includes a variety of learning structures in which students study together in a specific type of group work that possesses five defining elements (Johnson & Johnson, 1989):

1. Positive interdependence (sink or swim together – a win-win relationship)
2. Face-to-face promotive interaction (helping each other learn, applauding success and efforts)
3. Individual and group accountability (each one answerable to the achievement of the goal)
4. Interpersonal and small group skills (communication, trust, leadership, decision making, conflict resolution)
5. Group processing (reflecting on how well the team is functioning and how to improve)

Benefits of cooperative learning are demonstrated by extensive research showing the efficacy of cooperative learning as a pedagogy that raises academic achievement and promotes social-emotional learning (Gillies, 2007; Johnson, Johnson, & Stanne, 2000; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981). Character educators use cooperative learning as an essential strategy because it fosters positive social attitudes and competencies among group members (Gillies, 2007; Johnson & Johnson, 2013;

Johnson & Johnson, 1989). Research studies show cooperative learning raises academic achievement and improves student behavior when compared to more didactic pedagogies (Cortez, Nussbaum, Woywood, & Aravena, 2009; Divaharan & Atputhasamy, 2002; Gokkurt, Dundar, Soylu, & Akgun, 2012; Johnson, Johnson, & Smith, 2007; Jolliffe, 2015; Law, 2011; Smith- Stoner & Molle, 2010; Takeda & Homberg, 2014). A meta-analysis of multiple studies of cooperative learning showed an increase in academic achievement ranging from .30 to .78 as the effect sizes when teachers used cooperative learning (Marzano, Pickering, & Pollock, 2001); these effect sizes support the assertion that academic achievement increases significantly when students study together cooperatively. Educators explain the outcomes produced by cooperative learning activities in various ways, and, as elaborated below, researchers debate the theoretical basis for the beneficial achievement outcomes attributed to cooperative learning and the utilization of cooperative learning (Gillies & Boyle, 2010; Slavin, 2012).

Objections to cooperative learning. In spite of its effectiveness – and support of leading educators – research shows that cooperative learning is underutilized or improperly used by many teachers (Abrami et al., 2004; Gillies & Boyle, 2010; Kelly & Fetherston, 2008; Kohn, 1992; Sharan, 2010; Slavin, 2012). When interviewing teachers about their perceptions of EnTeam games, it was helpful to consider the following questions: Why do teachers under-utilize a pedagogy that is known to be effective? Why do teachers confuse group work (assigning students to work together) and cooperative learning (which uses the five elements listed by Johnson and Johnson above) although most teachers had training in cooperative learning in their colleges of education (Slavin, 2012)? Why does encouragement by researchers and professional-development trainers

to use cooperative learning meet with resistance (Sharan, 2010)? Scholars have little agreement in their answers to these questions, but they have no shortage of hypotheses and assumptions that profess to explain the avoidance and improper use of cooperative learning.

For example, Yael Sharan, an oft-cited specialist in cooperative learning, lists several explanations for the under-utilization of cooperative learning. Her first hypothesis is not focused on teachers but on student resistance due to "low tolerance for uncertainty" (Sharan, 2010, p. 300). In her second hypothesis, Sharan contrasts three models of education: transmission of knowledge, transaction of knowledge between teacher and student, and transformation and empowerment of the student with teacher as co-learner with the student. She states that teachers who hold to the traditional view of the teacher as transmitters of knowledge will eschew cooperative learning because cooperative learning shifts the attention from being teacher-centered to being student-centered. In other words, Sharan identifies a theory of teacher beliefs that mitigate against cooperative learning due to the assumption that the purpose of education is to transmit knowledge from teacher to student (2010, p. 305-307).

Sharan adds another hypothesis explaining the underutilization of cooperative learning in k-12 education: university professors – including those in colleges of education – teach about cooperative learning rather than giving consistent, effective experiences with cooperative learning in their university classrooms (2010, p. 307).

Two decades earlier, Alfie Kohn argued for four hypotheses to explain teachers' underutilization of cooperative learning using educational philosophy rather than empirical methods (Kohn, 1992):

1. Cooperative learning reduces the teacher's control and predictability in the classroom.
2. Cooperative learning demands that teachers pay attention to social goals as well as academic goals.
3. Cooperative learning challenges our society's commitment to individualism.
4. Cooperative learning challenges our society's commitment to the value of competition.

While Kohn uses persuasive arguments and compelling logic to make his case, he is short on data. Gillies and Boyle gathered data to explore the resistance to cooperative learning by repeatedly interviewing ten middle-school teachers and recording the difficulties they had implementing cooperative learning. Teachers reported that working in cooperative learning groups was challenging for students and complex for teachers (Gillies & Boyle, 2010).

A quantitative approach to answering the question of teacher underutilization of cooperative learning is developed by Abrami and his colleagues by surveying teachers on their self-reported use of cooperative learning (Abrami et al., 2004). Using survey results and demographic characteristics, they could explain almost half of the variation in use of cooperative learning that was self-reported by teachers. Some of the survey prompts with the highest mean-effect sizes – both positive and negative – included the following (Abrami et al., 2004 p. 209):

1. Cooperative learning would not work with my students.
2. I believe I can implement cooperative learning successfully.
3. I find that cooperative learning is too difficult to implement successfully.
4. I understand cooperative learning well enough to implement it successfully.

5. I prefer using familiar teaching methods over trying new approaches.
6. Cooperative learning is appropriate for the grade level I teach.
7. Using cooperative learning is likely to create too many disciplinary problems.
8. My students currently lack the skills for effective cooperative group work.
9. Implementing cooperative learning takes too much preparation time.

Analyzing teachers' responses to these and other prompts led to the assertion that there is a significant "gap between the recommendations from theory and research and classroom practice" (Abrami et al., 2004, p. 210) and included a recommendation (ibid):

> Future research should explore ways to increase the classroom use of cooperative learning as a method of enhancing student academic achievement. Increasing teacher expectations of student learning success (effectiveness) while decreasing the perceived costs in terms of teaching time (efficiency) may be fruitful.

This recommendation aligns with the goals of the present study and is discussed again in Chapter 4.

One of the objections to cooperative learning commonly voiced by teachers and students is the "free-rider problem" in which one student does most of the work and others receive the grade without learning the curricular content (Dingel, Wei, & Huq, 2013),

Measurement of performance in cooperative learning. The primary method for measuring the results of cooperative learning projects is to use individual testing of content mastery. For example, Robert Slavin, a frequently cited scholar on cooperative learning and the founder of *Success for All* cooperative-learning programs widely adopted by schools, explains the standard assessment process for a cooperative-learning game:

Following team practice, students take quizzes on the material they have been studying. Teammates may not help one another on the quizzes; they are on their own. The quizzes are scored in class or soon after; then the individual scores are formed into team scores by the teacher. (Slavin, 1988, p. 9)

Similar statements about assessing performance after the cooperative learning activities (rather than embedding assessment within the cooperative learning activities as explained in Appendix A) are repeated by other leaders in cooperative learning (Johnson, Johnson, & Smith, 2013; Sharan, 2010).

Since EnTeam games are an extension of cooperative learning that includes all five elements listed above plus an additional element, a process for measuring cooperative performance between teams, it is necessary to examine the literature related to perspectives on measuring performance – both cooperative performance and competitive performance. Therefore, the next section of this literature review examines alternative perspectives on score keeping and the unique contribution offered by game theory as a means for measuring cooperative performance.

Game theory holds clues to this puzzle about cooperative learning and related questions: What are the underlying causes for resistance to using cooperative learning in the classroom? Can any of the cultural biases against cooperation be attributed to the absence of scoreboards that measure cooperative performances? Is it possible to keep score of cooperative performances?

Step four is about preparing adults to give children experiential education opportunities to self-assess their performance as collaborators. In other words, it is argued that adults must develop an understanding of something that children do frequently when

playing catch – count their cooperative performance. Adults must realize that it is possible to measure cooperative performances. Furthermore, adults need to experience that playing games that measure cooperative performances can be engaging, challenging, enjoyable, and educational. Game theory enables adults to conceptualize the measurement of cooperative performances. Furthermore, adults must also allow children time and authority to gather data from games and reflect on their experiences using the data from the games.

Game Theory

As noted on page 14, *Game theory* is a system of ideas (also known as *economic game theory* and *decision theory*) that facilitate the study of behavior in situations in which the actions of one individual impact the choices available to another individual (Kreps, 1990). While social interdependence theory gives a conceptual foundation on which games that keep score of positive interdependence could be built, the measurement process is not as well developed in social interdependence theory as in the sister field of economic game theory which provides structures and archetypes that facilitate quantification of competitive performance and cooperative performance (Colman, 1982; Gummerum et al., 2008; Stevens, 2008). Social interdependence theory addresses questions of competition and cooperation in ways that are similar to economic game theory with one important difference in emphasis: social interdependence theory does not include a process for quantifying performance that is essential for measuring improvements in performance (Johnson et al., 2013). Game theory analyzes competition and cooperation in ways that are consistent with social interdependence theory and

reaches broadly similar conclusions but with greater emphasis on quantification of results (Abele, Stasser, & Chartier, 2010).

Game theory provides mental constructs and activities that are useful for classroom teachers to develop students' thoughts about cooperation and conflict through reflection on the outcomes of games (Gummerum et al., 2014; Jenkins, 2009). Although game theory is often presented through highly-abstract mathematical models of complex relationships between individuals (such as individual people, individual nations, or individual microorganisms), the basic concepts of game theory can be presented in simple forms that students can use in classroom games such as one shown in Table 1 *Scissors and paper prisoners' dilemma* below. When students experience the measurement of cooperative performance and competitive performance, the games can be intellectually liberating because they abstract essential elements of behavior and quantify them in ways that force reconsideration of assumptions (Stevens, 2008). The critical assumption for the present study pertains to the variety of scoring systems that can be used when designing sports and games – and the time and place for different metrics.

One of the many game-theory structures that quantify cooperation and non-cooperation between players is given the misleading name of *prisoners' dilemma*[1]. Psychologists, mathematicians, biologists, economists, political scientists, and others use prisoners' dilemma as a term referring to any situation where the total benefits that the members of a group can secure are maximized by cooperation, but an individual may be

[1] The term *prisoners' dilemma* is derived from an idea published in 1950 by researchers at RAND Corporation: the length of the sentences for two prisoners depends on whether they confess and implicate each other in a crime. Although they could get light sentences if they cooperate in lying, rational self-interest leads them – when the coefficients are set appropriately – to implicate each other in their crime and be punished with longer sentences. (Dixit & Nalebuff, 2008).

able to maximize personal benefit in the short run by not cooperating (Chinn-Ping, 2000; Dixit & Nalebuff, 2008; Stevens, 2008; Taylor & Nowak, 2009).

To illustrate how game theorists quantify cooperation and competition, consider a version of prisoners' dilemma truncated from the game "rock, paper, scissors" and using just paper and scissors and the following scoring matrix (Vesperman & Clark, 2016):

Table 1 Scissors and paper prisoners' dilemma scoring table and hand signals

		Player B	
		 Paper	 Scissors
Player A	 Paper	1, 1	-1, 2
	 Scissors	2, -1	-2, -2

In the game summarized in Table 1, the two players score points depending on whether they cooperate (choose paper – signaled by an open hand) or defect (choose scissors – signaled by two fingers): the first number in each ordered pair is the score for player A, and the second number is the score for player B.

Play consists of both players simultaneously giving a hand signal for either paper or scissors. For example, after playing the game three times, both players could have a score of three points if both choose paper in each game. In game four, if player B chooses not to cooperate (by choosing scissors) and player A chooses to cooperate (by choosing paper), then player A's score would drop to two (3 – 1) and player B's score would increase to five (3 + 2). If play continues, the strategies the students adopt can become fodder for debriefing around the issues such as cooperation and competition, self-interest and community, betrayal and trust, and related moral issues.

The utility of this simple game is that it provides a structure for simulating alterative competitive and cooperative relationships and changing the benefits and costs by altering the coefficients in the matrix. As they play variations of this game, players

experience how they can measure cooperative performance and see ways alterative payoffs influence behavior. The game structure gives students low-risk opportunities for experiencing and reflecting on experiences and debriefing simple components of interdependence. Once the players grasp the basic concepts, then the examples can become more complex and more closely related to life situations. More robust forms of prisoners' dilemma games involve collaboration between players prior to an event and require skill in accomplishing the tasks required in the event.

For example, educators have used prisoners' dilemma in the context of civics lessons about the negotiations with Iran regarding nuclear weapons, George III and the American Colonists, and many topics in biology, economics, math and other subjects (Axelrod & Hamilton, 1981; Frank, 2009; Vesperman & Clark, 2016).

By engaging students in decision making in situations that simulate real-world dilemmas, game theory serves character education because game theory provides a structure for analyzing and contrasting various rules, strategies, benefits, and costs under alternative options and frameworks. Game theory opens new possibilities because it facilitates new views of familiar situations by demanding that thinkers examine the values, cultures, and relationships that connect people together (Chinn-Ping, 2000; Gummerum et al., 2008; Levin, 2009; Osborne, 2003). Game theory opened the way for the development of the scoring system used in EnTeam games and presented in Appendix A.

For the exploration of EnTeam games, it is helpful to observe that the origins and development of cooperative behavior manifested as respect and support for others is still puzzling to game theorists who study the evolution of cooperation in animals including

humans. For example, a group of game theorists assembled in 2008 by Princeton University and the Templeton Foundation produced a volume that focuses on the third of three questions left unanswered by Darwin's theory of evolution (May, 2009, Kindle loc.56):

> Darwin's third major unsolved problem, which he himself arguably saw as the most important, is not yet solved. This problem was, and still is, explaining how cooperative behavior among animals evolved. The present volume is devoted to recent advances toward a solution. At first glance, the answer seems easy. You pay some small cost to gather a much larger cooperative benefit. For example, a prairie dog takes a personal risk in giving an alarm call, but all the colony benefits and, by taking turns as alarm giver, each individual's group benefit exceeds the occasional risk. But any such arrangement is immediately vulnerable to cheats who enjoy the benefits without paying the risk-taking dues. In evolutionary terms, such risk-avoiding cheats have a selective advantage. Today we would say their enhanced probability of survival, and consequent greater reproductive success, means their uncooperative behavior is more represented in the next generation (possibly via their genes, or alternatively by teaching their offspring - Dawkin's memes). It is thus unclear how such observed cooperative phenomena can arise, or if it does, how it can be maintained.

While May and other scholars admit that they do not yet fully understand the origins and perpetuations of cooperation, they see opportunities for the principles of game theory to contribute to the efforts to solve pressing problems in the world such as global warming, rapid extinctions of species, water shortages and other issues that require greater

cooperation among disparate groups of people (Levin, 2009). The challenge is to provide efficient procedures that teachers can use to engage students in wrestling with ramifications of conflict and cooperation.

By playing games that put students in situations that fit the game-theory models and by engaging the students in thinking through the implied issues (such as trustworthiness, honesty and deception), the students develop moral reasoning skills and gain an understanding of the dilemmas (Gummerum et al., 2008). The present research relates to Darwin's unanswered question about the evolution of cooperation: if the scholars who specialize in the study of cooperation admit they do not understand some of the fundamental principles of cooperation and competition, then there is a need to prepare young people through experiences that could nurture the ideas that may lead to deeper understanding of cooperative performance and the measures that they use to gauge goal attainment. This includes the scoreboards that children are taught to use to determine if they are winners or losers.

While game theory provides a scoring matrix for quantifying cooperative performances, it does not package that process so teachers can easily adapt the games across a wide range of curricular contents. Therefore, the literature review must continue to explore scorekeeping methods based on alternative concepts of winning.

One purpose of counting and measuring is to make comparisons. As noted above, psychologists define competition as a process of making social comparisons and ranking people into various hierarchies. One familiar form of social comparison is winning and losing in games.

Alternative approaches to scoring performance. Two radically different approaches to the scoring process are offered by *true competition* and the *new-games movement* described below. Both approaches are relevant to this literature review because they provide insights to the central question on the merits of games that keep score of cooperative performance.

As mentioned briefly in the definitions above, *true competition* is an approach to win-lose competition that develops attitudes, behaviors, assumptions, and beliefs through a form of character education that involves seeing opponents as beneficial agents for self-improvement rather than as enemies to be defeated (Shields & Bredemeier, 2009, 2011). In true competition, those participants who perceive win-lose games as opportunities to bring forth the best performance both sides can deliver are described as "true competitors" (Shields & Bredemeier, 2009). The alternative approach to competition, described as "decompetition," is analogous to the military approach to war in which the players are in an adversarial relationship in which the one side endeavors to vanquish the other side (Shields & Bredemeier, 2009 and 2011; Shields, Funk, & Bredemeier, 2015).

For the present research, the remarkable aspect of *true competition* is that it endeavors to cultivate a win-win attitude between opponents while continuing to measure win-lose performance, and therefore even in a game where the scoreboard is telling the players that one person is better than another and defining one side as the loser and the other as the winner, there can still be valuable benefits for both the loser and the winner: namely, the opportunity to test oneself with a closely-similar rival and the resulting beneficial development and growth for both sides.

In the philosophy of *true competition*, the score is of secondary importance; the primary issue is the development and growth of character, skills, strategies, etc. that the contest can produce when approached as described by Shields and Bredemeier. Educators such as coaches who follow the philosophy of *true competition* stay within the win-lose paradigm even as they strive to lift the thought of the players to seek a higher goal. Shields and Bredemeier (2011, p. 25) explain:

> What is being sought? In sports, it is excellence of physical performance. It is the exhilaration, excitement, and sense of accomplishment that come with maximizing one's physical and mental potential in the pursuit of a worthy goal. In true competition, each party pursues excellence by trying to meet the challenge posed by opponents. While sport is an obvious and clear example, similar comments would apply in any context where competition is possible.

The concept of *true competition* is related to EnTeam games in two ways:

1. Both approaches challenge players to focus on improvement in performance because success is achieved by becoming more skillful, more motivated, more focused, and more experienced when performing in the event. Both approaches identify the players on different teams as partners who need and value each other as an essential requirement to achieve improvement (Shields & Bredemeier, 2009; Wohlfarth, 2002)
2. Also, both approaches challenge people to examine the fundamental concept of winning and losing, although the approaches contextualize the issue differently. True competition continues to measure performance within the win-lose paradigm (Shields & Bredemeier, 2009) while EnTeam games shift

> to a different paradigm for measuring performance based on scoring goals through collaborative efforts with teams sharing information and developing strategies so both sides learn to offset each other's weaknesses and capitalize on each other's strengths (Wohlfarth, 2002).

Orlick and others in the *new games movement* take an alternative approach to the problem of moral education through games: rather than educate players to treat others with respect and value by changing the metaphors – as true competition teaches – advocates of *new games* attempt to remove the scoring process (Fluegelman, 1981; "New games movement," 2012; Orlick, 1982). The *new games movement* flowered in the 1970's and created numerous games in the spirit of the counterculture of that period by crafting activities with no score keeping and that eschewed the concepts of winning and losing (Orlick, 1982). Despite their disdain for scoring, a few games from that era kept score. For example, Orlick proffered a version of volleyball that involves counting the number of points that two teams can score together (Glakas, 1991). This version of volleyball blurs concepts of winning or losing in contrast to the version of EnTeam volleyball (described in Appendix A) which explicitly uses the data from the game to inform players how well they are doing at helping each other (Wohlfarth, 2002). Most of the "new games" have not gained wide acceptance although a few off-shoots, such as *Ultimate Frisbee,* endure and have morphed into traditional win-lose scoring formats ("New games movement," 2012).

The remaining question is whether these alternatives to traditional views of win-lose scoring have any hope of rebalancing the skew in the culture of winning and losing that adults bestow on children. In his descriptions of the earliest stages of development,

Piaget notes that winning and losing are amorphous to young children and only become concrete in later stages of development (Piaget, 1965 p. 14). For example, after a six-year-old "taught" Piaget how to play the game of marbles, Piaget asked the question "Who has won?" and the child responded, "We've both won." Piaget followed up with the question, "But who has won the most?" Piaget asserted that the young child did not understand this follow-up question (p. 28). Piaget explained that not until the child reaches a more advanced stage of development (which Piaget numbers as stage 3) "… when by 'winning' the child refers to the fact of getting the better of the others…" does the concept of winning and losing become fixed into the singular form that presumes there must be a loser if there is a winner (p. 33). While recent research has found that moral development advances at younger ages than Piaget found, the basic sequence of progression of thought remains a widely accepted premise in developmental psychology (Gummerum et al., 2008; McDevitt & Ormrod, 2004).

When one examines Piaget's assumption that winning requires "getting the better of the others," one can see the underlying question for the present research. What if children were offered at least a few games that involve both sides losing or both sides winning as determined by their ability to improve their performance each time they play? Would the players interpret the scores as feedback data that inform them and guide them to better working relationships with players on other teams? The following section on feedback suggests that students might learn from such feedback.

Feedback that Reinforces and Supports Learning

Feedback can be defined as "…information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or

understanding" (Hattie & Timperley, 2007, p. 81). Feedback has been a topic that has suffered from faulty and misleading research according to a detailed study by Kluger and DeNisi (1996) who make the point that feedback can be harmful or helpful to productivity depending on how it is framed. Feedback reduces productive performance when the focus is on the person doing the performance rather than focusing on the outcome of the performance (Kluger & DeNisi, 1996). Subsequent research has explored the failure of feedback to improve performance. For example, a comprehensive review of feedback literature found that "Praise for task performance appears to be ineffective, which is hardly surprising because it contains such little learning- related information" (Hattie & Timperley, 2007, p. 86).

Effective feedback for teams has specific characteristics according to one group of scholars (Gabelica, Van den Bossche, De Maeyer, Segers, & Gijselaers, 2014):

1. Quality feedback for a team is "accurate, specific, well-timed, regular, non-threatening, shared, directed at teams it targets, and distributed fairly amongst team members" (p. 87);
2. The team receiving the feedback only consists of active participants who are working on a goal in unity without extraneous members;
3. The team members perceive the feedback as useful for learning how to improve.

These guidelines for effective feedback are significant to teachers forming cooperative learning teams. While feedback might be commonly assumed to be words from one person to another, the type of feedback of concern in this study comes in the form of scores that students generate as they play games in which they can score goals

only when they collaborate with other students to overcome challenges such as ignorance, confusion, apathy, or distractions. As the students play these games, they record their progress on score sheets and observe whether they are improving their scores (winning) or not improving (losing).

Scorekeeping as a feedback mechanism. One benefit of playing games that keep score of cooperative performances is that players receive data they can use to assess their ability and performance when striving to accomplish mutually compatible goals together. The fact that scorekeeping in games gives players and observers immediate information about the quality of their performance is significant because it empowers players to self-assess whether change is needed before success can be achieved (Garris et al., 2002). Such feedback is inherent in effective educational games as shown on the following diagram presented by Garris and her colleagues which starts with two inputs: instructional content and a game format.

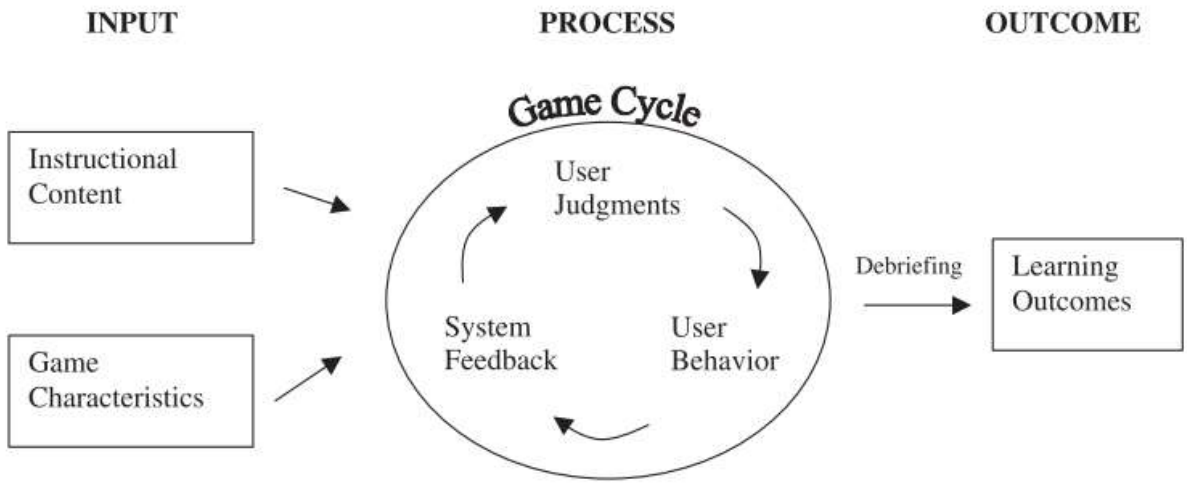

Figure 1. Model of learning in three stages: input + process with debriefing = learning (Garris et al., 2002)

The model shown in Figure 1 depicts learning with an educational game as a recursive process in the sense that students have repeated attempts to improve performance, and they see their progress as measured by the score – the system feedback. Players also make judgments about the experience, and when the game involves multiple players from different sides, the various perspectives interact and sometimes conflict. This raises the need for players to see the process from different perspectives if they are going to cooperate.

Social Perspective Taking

The ability of players to cooperate depends significantly on their ability to take in information from others and perceive what other players are seeing, experiencing, and feeling (Fett et al., 2014). Research on social perspective taking distinguishes between grasping another person's point of view and changing behavior in light of the other person's perspective. Unsurprisingly, one of the primary determinants of whether the behavior accommodates or diverges from the interests of the other person is whether they are in a competitive or cooperative interaction (Epley, Caruso, & Bazerman, 2006; Fett et al., 2014).

Using a game based in economic game theory to study social perspective taking, a group of researchers in The Netherlands tested the development of pro-social behaviors of young people 9-25 years old. They found that older players were more skillful in social perspective taking than younger players (van den Bos, Westenberg, van Dijk, & Crone, 2010).

Fett and a team of researchers used a different game to test teenagers' levels of trust toward others and their response when the trust was violated and found that those

adolescents who had high levels of social perspective taking responded more severely against the one who violated trust in the game than those with lower levels of social perspective taking. They compared behavior of boys and girls and did not find that girls had higher levels of social perspective taking than boys, but they did find that boys reciprocated more severely against trust violators than girls (Fett et al., 2014).

These studies on social perspective taking highlight the need for players to gather information from other players as they interact and use those insights to make choices about how to treat others, when to trust them, and how to reciprocate to them. The research in social perspective taking can guide planning for classroom use and raise questions that can be useful for future research on games that challenge people on different sides to keep score of how well they work together to accomplish goals.

The next topic in this literature review addresses an essential part of the learning process: how to use the information that players glean from the scores on the scoreboard and the insights gained from collaboration with players on the other side – in other words, reflection on experiences and relationships.

Reflection as a Learning Process

Experiential educators commonly use a four-phase learning-cycle diagram to describe the process by which learners construct meaning from events: (1) experience an event (2) reflect on the experience (3) generalize from the experience (4) apply the generalization to future events (Johnson & Johnson, 2013; Luckner & Nadler, 1997). While reflection is a central element of cooperative learning, the structure of the reflection phase influences the depth of learning (Di Stefano, Gino, Pisano, & Staats, 2016). Cooperative learning can be enhanced significantly if combined with effective

debriefing by teachers who are prepared to lead students to reflect on both the content and the learning process (Kramarski & Mevarech, 2003; Luckner & Nadler, 1997).

A study that is particularly relevant to the present research was by Kramarski and Mevarech (2003) examining secondary school students learning linear functions under four different teaching methods[2]. They found cooperative learning could be enhanced by teachers who trained their students to reflect on their thinking after approaching a problem. This type of metacognitive training enhanced learning through three types of questions:

1. Comprehension questions that challenge the students to describe the meaning of the problem they have been trying to solve and the devices, such as graphs, they are using.
2. Strategic questions that challenge students to consider alternative methods they might use to attack a problem based on methods they have used in the past and the principles or conditions involved in the current situation.
3. Connection questions that challenge students to contrast the current problem they have been trying to solve with other problems they have solved in the past.

The results of this research showed that cooperative-learning groups without metacognitive training did not perform as well as individual students who had metacognitive training; however, students with metacognitive training performed better

[2] The four teaching methods used were: cooperative learning combined with metacognitive training, individualized learning combined with metacognitive training, cooperative learning without metacognitive training, and individualized learning without metacognitive training.

in cooperative-learning groups than they did individually. In their conclusion, Kramarski and Mevarech wrote (p. 304):

> The present study indicated that placing students in cooperative groups is not sufficient for enhancing mathematical reasoning. According to the present study, metacognitive training is an effective means of facilitating mathematical reasoning, even when the training is implemented in individualized settings.

This conclusion reinforces the importance of teacher-led debriefing and aligns with the flow of learning depicted by Garris et al. in Figure 1 above – and suggests the value of professional development for teachers to facilitate debriefing.

Research on learning in interdependent groups shows that feedback alone is not sufficient to enhance the performance of a group: "our findings support the value of giving accurate and timely feedback in teams only if we seek to encourage active engagement from and reflective interactions between team members" (Gabelica et al., 2014, p. 93). One of the implications of this research is that interdependent groups need to be able to communicate honestly and accurately. This raises the question of whether this team-reflection process may be undermined by games that require players on different sides to deceive one another.

This brings the literature review to an under-researched question: How do alternative methods of measuring performance impact moral development? This question deserves careful consideration because it could impact moral education and popular culture.

Moral Aspects of Alternative Frameworks for Keeping Score

Trust and the exchange of accurate information are essential for cooperation: "To coordinate efforts to achieve mutual goals, participants must (a) get to know and trust each other, (b) communicate accurately and unambiguously, (c) accept and support each other, and (d) resolve conflicts constructively" (Johnson & Johnson, 2009, p. 369). Educators need to consider these concepts carefully when planning lessons with games.

Whenever an educator designs a scored game for achieving a learning objective, a pivotal question is the choice between scoring on a win-lose basis or scoring on a win-win basis (Wohlfarth & Stevens, 2003). For example, when James Naismith, an army chaplain and physical-education teacher, invented basketball in 1891, he chose to use a win-lose scoring process that sets the teams against each other (Bellis, 2015; Johnson, 2015). His choice is consistent with the history of ancient sports such as the Olympics when the purpose of scored games was to prepare soldiers for war (Remijsen & Clarysse, 2012). Presumably, Naismith did not consider keeping score of how well teams did at helping each other achieve their goals. One report described Naismith as an employee "… given 14 days to create an indoor game that would provide an 'athletic distraction' for a rowdy class through the brutal New England winter" (Bellis, 2015, p. not numbered).

If Chaplain Naismith had more time, perhaps he would have considered the moral aspect of teaching players that they can only win if someone else loses and the implications of giving young people the experience of winning only one way – by defeating the other side.

Here is a paradox: adults tell children that they should be honest and then teach games that require and cultivate skills in deception and subterfuge (such as faking a move in one direction when the real intent is to move in the opposite direction) and omit development of skills needed for honest and forthright collaboration between teams. For example, the game of poker requires players to pretend they have a stronger hand of cards than they actually possess or, alternatively, to conceal the fact that they have a strong hand and induce the other players to continue to play so deceivers can take their opponents' money. If it is true that moral education is intended to cultivate candor, honesty, and forthrightness in dealings among people, then it can be argued that adults who teach only games that cultivate and reward deception, dishonesty, and subterfuge complicate the development of moral reasoning and moral behavior in children – and may even foster dishonesty in business and corruption in politics.

This observation that deception is sanctioned as acceptable by social convention in some contexts (such as poker) and deemed unacceptable and immoral in other contexts (such as having extra cards up one's sleeve) raises questions for educators because the structure of games – especially methods for scoring goals – may shape the paradigms through which players young and old see the world. According to some researchers, these questions have not been fully examined and may deserve deeper research and analysis. For example, Morris asserts that "While a great deal of moral philosophy has been committed to (1) lying and deception, generally, and (2) moral philosophy in sports, surprisingly, very little of the academic discourse has combined the two" (Morris, 2013, p. 179). Morris states that one of the few researchers who has addressed this interrelationship is Pearson who divides deceptions into two categories: *strategic*

deception by which she means those situations, such as team sports, where both sides know in advance that players will try to mislead or trick the players on the other team and *definitional deception* by which she means situations where the participants have contracted to give each other accurate information, and yet one side (or both sides) knowingly and willfully, misleads another (Pearson, 1973). Pearson's assertion that the former is ethical and moral while the latter is unethical and immoral is a useful and reasonable perspective, but it leaves unanswered the consequences of this nuanced distinction: is the distinction clear to children and their educators? Observing the daily news, one may ask how many adults have a mature grasp of Pearson's distinction.

The steps taken above have provided the vocabulary and theoretical basis for addressing the issue raised in the problem statement on page 8 as well as related issues such as the puzzle regarding cooperative learning and its underutilization. The next step is to apply the theory to find the answers and thereby demonstrate the axiom that nothing is more practical than a good theory.

Conclusions from the Literature Review

The literature review presented above does not address any research that compares the traditional win-lose scoring systems with win-win scoring systems used in sports or games. This omission of literature is not attributable to lack of time and effort. The author has searched and queried for years to find others who are studying differences in scoring systems. He has used search engines and the assistance of research librarians at several universities and the Library of Congress to find others who are studying scoring systems that keep score of cooperative performances. He has asked many educators including the scholars who specialize in sports and games. Members of the executive

committee of the *International Association of the Philosophy of Sport* promised to pole their list-serve for the names of other researchers who study in this area. So far, this effort has identified no research comparing win-win scoring systems with win-lose scoring systems.

If it is true that there is little scholarship examining win-win scoring systems, what is the explanation? This dissertation puts forth the argument that the scarcity of scholarly literature examining games that keep score of cooperative performances between different sides does not mean that such games are unworthy of rigorous analysis nor does it mean that scoring systems for measuring cooperative performances are non-existent. Many times, the author has observed children as they invent games, and frequently children's games involve keeping track of the number of times they can work together to accomplish a goal. One common example is two players counting the number of times they can throw and catch a ball without dropping it. The same concept is found in some board games published in recent years such as *Race to the Treasure* (Manola, n.d.) as well as computer games such as *SimCity* (Electronic Arts, 2017; Sicart, 2009). Since the phenomenon of games that keep score of cooperative performances exists (although miniscule compared to the ubiquity of games that keep score of win-lose performances) but is rarely examined by scholars, the field is ripe for scholarly examination of the impact on students of games that keep score of cooperative performances. The classroom is one place where such research could be conducted by asking teachers about the outcomes they perceive when such games are used for educational purposes.

Since scholarship on alternative scoring systems is scarce, this literature review has drawn on theories and studies that are relevant to the purpose of this study. After reviewing definitions that scholars use for essential terms, one of the salient lessons is that the vocabulary for win-win relationships is not as well developed as the vocabulary for win-lose relationships. For example, there is no word in English for events that keep score of win-win performances between opposing sides, but there are many words – such as debate, baseball, spelling bee, lacrosse, beauty contests, rivalry, victory, etc. – for events that keep score of win-lose events between opposing sides. If it is true that language shapes thoughts, this void in language may explain the lack of win-win events that challenge different sides to work together.

Theories and research by Deutsch and others (cited above) who developed social interdependence theory led to progress in understanding the peacemaking process and the potential benefits of conflicting ideas and values when approached from the perspective of positive interdependence. Social interdependence theory benefits education by providing a foundation for cooperative learning.

Although numerous studies provide data showing that cooperative learning increases academic achievement and develops positive character, there is resistance to its use. Kohn's (1992) explanation for the resistance to cooperative learning includes his assertions that cooperative learning conflicts with popular assumptions about the preeminence of competition and individualism. If Kohn is correct in his assertion, then culture changes may be required before any process that extends cooperative learning – such as games that keep score of cooperative performances – can permeate education.

Stevens (2008) shows how economic game theory can serve as a lever to open the culture to cooperative approaches to interrelationships in the classroom by reforming the culture in schools. Abele, Stasser, and Chartier (2010) tie game theory as a complement to social interdependence theory because both explore cooperative and competitive relationships. The essential lesson is that game theory adds a measurement process which social interdependence theory lacks.

Since game theorists such as May, Levin, and other co-contributors classify game theory as being in early stages of development, the invitation is open for other educators to explore scoring mechanisms that can be configured for use measuring whether people are improving as collaborators with those on other sides. Vesperman and Clark (2016) show ways to bring game theory into the secondary-school classroom, but they do not show how scoring systems derived from game theory can be used to measure whether students are improving in their ability to share ideas. The remaining challenge is to transform game theory into more teacher-friendly formats and activities that teachers can use to quantify cooperative performances.

Another lesson from the literature review is the need to draw together strands from multiple areas of research. For example, the literature on game theory is useful for innovative ways to quantify competitive and cooperative performances, but it does not meet the needs of educators who seek to follow Kohlberg and Hersh's assertion that "… the aim of education ought to be the personal development of students toward more complex ways of reasoning" (1977, p.55). Nor does game theory guide educators who strive to cultivate character as defined by Berkowitz and Bier as "…the set of psychological characteristics that motivate and enable an individual to function as a

competent moral agent" (2013, p. 6). To address these aspirations, the literature review touched on scholarship that explicates feedback, social perspective taking, reflection, and moral aspects of scoring systems.

The research on feedback shows that students are harmed when they receive personal accolades rather than performance-specific information about their progress. Feedback in the form of scores from games give students data they can use to self-evaluate whether they are improving in their performance. These data require students to look from multiple perspectives when they are studying together, and the literature on social perspective taking shows that students mature gradually and that cooperative activities can accelerate the expansion of points of view.

Johnson & Johnson (2013) identify reflection as an essential element of learning. Kramarski and Mevarech (2003) found gains in academic achievement by teaching students to reflect on their work using a metacognitive approach: pausing to consider their experiences, comparing past experiences with new challenges, and using the lessons learned to solve other problems.

Johnson and Johnson (2009) assert that when a group is reflecting on an experience together, candid and accurate information is essential; it is harmful if the participants deceive one another or give misleading information. Morris (2013) points out that games that teach deception have not been examined thoroughly by scholars. Pearson (1973) makes the case for certain forms of deception being moral and ethical. This creates a conundrum that deserves further analysis and synthesis. A question that is relevant for the present research is whether educators perceive that students gain a deeper

understanding of moral behavior when the students collaborate with the other side and score goals together.

By using a scoring process that objectively records on a scoreboard the progress making goals together, the players from different sides may learn to think together and offset each other's weaknesses, build on each other's strengths, and reflect on the lessons learned in the process of helping others achieve their goals. Perhaps research will reveal whether the outcome is an increasing capacity for finding solutions to conflicts, overcoming limitations, and increasing respect and justice.

For the author, the primary conclusion from the literature review is the significant gap in the experiential education of children because the scoring systems most commonly used in games and sports omit the quantitative measurement of cooperative performance between teams; and therefore, learning through games is unbalanced because it gives the preponderance of attention to win-lose contests. One obvious consequence of win-lose competition is that players learn the hazards of exposing their own weaknesses or vulnerabilities because opponents increase their chance of winning by exploiting any weaknesses or vulnerabilities they can discover in the other side. Perhaps games that keep score of cooperation between different sides will send the opposite signal, i.e., players might learn that exposing weaknesses or vulnerabilities is beneficial in win-win relationships because cooperators increase their chance of winning by overcoming individual deficiencies if they help each other overcome weaknesses and vulnerabilities.

One challenge is that traditional sports and games are deeply woven into the culture and have intense followers who seem to have little interest in changing the

culture. If the idea of changing the culture is to become vogue, it would help to have a simple explanation that is compelling at many different levels.

To explore the implications of these conclusions from the literature review, the next section describes research into the understudied territory of games that keep score of cooperative performance in schools as developed by the EnTeam approach.

The EnTeam Approach

One purpose of EnTeam games is to give players experience winning with people from different sides – especially groups of people who isolated or discordant. Another purpose is to prepare leaders who can nurture collaboration between different sides – especially those who are actively hostile toward one another.

The EnTeam theory of change. Starting with the notion that games can provide a safe, joyful, and efficient context in which to learn through experiences, the EnTeam theory of change provides players the opportunity to gather objective feedback in the form of performance data from an experience, learn by reflecting on the data, use the learnings to change strategies and tactics in future events. Teachers who use EnTeam games in the classroom follow the horizontal arrows in the following flowchart:

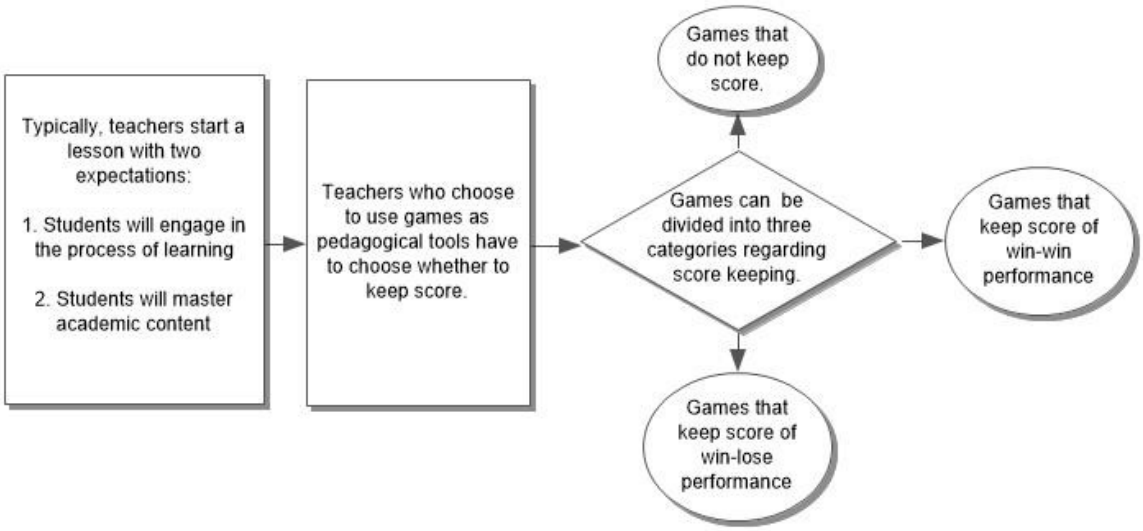

Figure 2 Teachers' choices when planning to use a game as a pedagogical tool

Figure 2 shows (in the ovals) three choices available to teachers who use games as pedagogical tools to leverage learning: games that do not keep score, games that keep score on a win-lose basis, and games that keep score on a win-win basis. For example, two students practicing phonics by taking turns making up lists of words that rhyme are in a cooperative game without scoring (the upper oval in Figure 2). If the students compete to see who can make up a longer list of rhyming words in two minutes, then the students are in a win-lose contest (the lower oval in Figure 2). If the students work together in a series of two-minute rounds to make up pairs of rhyming words with each student contributing one of the words in each pair, then they are playing a win-win game in which they lose or win depending on whether they can increase the number of pairs in a series of rounds of play (the right-hand oval in Figure 2). This figure contrasts the choices teachers face and points to the relevance of the central question of the research: the impact on students that teachers perceive when they use win-win games as pedagogical frameworks.

Since the author has found no research (other than studies of EnTeam programs) that directly tests pedagogical games that keep score of cooperative performance in the classroom, the object of the present study is to learn whether teachers perceive benefits from using EnTeam games. The first step is to build a concept model grounded on scholarly research and theory cited earlier in this chapter especially the following publications:

1. Cooperative learning grounded in social interdependence theory (Johnson & Johnson, 1981, 1989, 2000, 2005, 2013)
2. Game theory (Gummerum et al., 2008, 2014)
3. Feedback intervention theory (Hattie & Timperley, 2007; Kluger & DeNisi, 1996)
4. Reflection (Kramarski & Mevarech, 2003)

These articles and books provide a conceptual structure that can be combined with experiences from many classrooms to create a simple concept model or theory of change. The hypothesized benefits attributable to keeping score of cooperative performance according to this theory of change is illustrated in Figure 3:

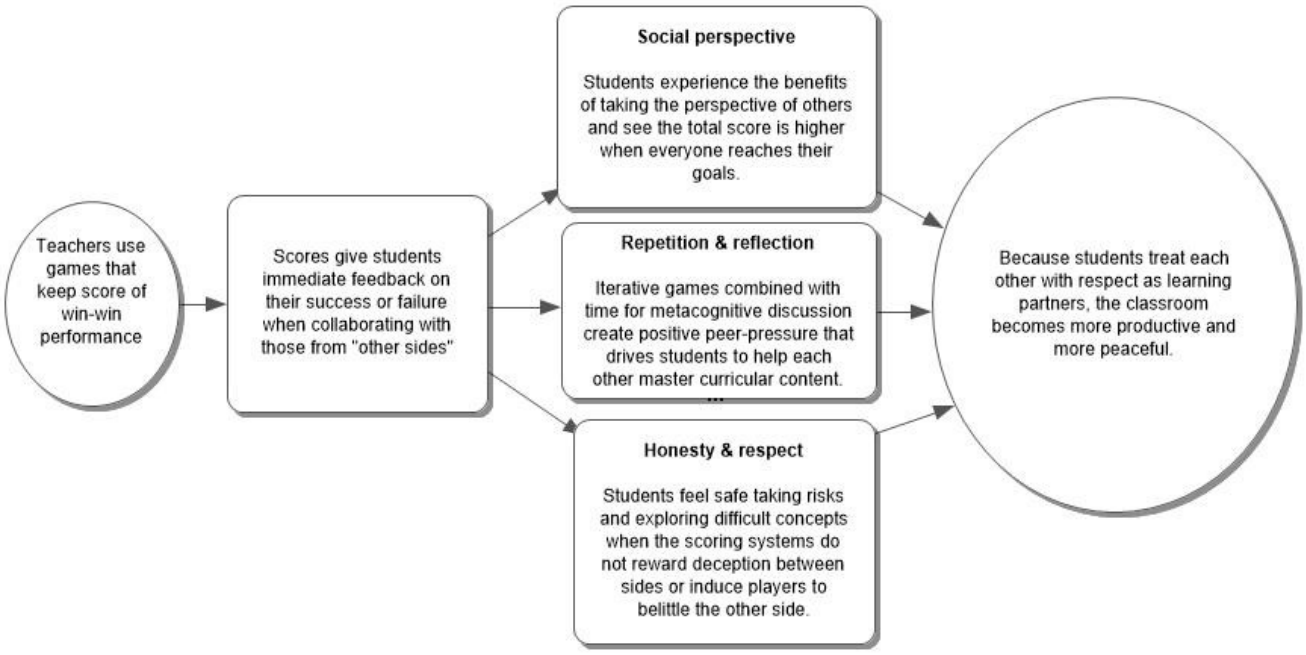

Figure 3 EnTeam theory of change showing hypothesized causes of productivity and peacemaking in the classroom

The EnTeam theory of change shown in Figure 3 above is that productive and peaceful relationships in the classroom can be increased by playing games that keep score of how well people on different sides cooperate, gathering data that they can use as feedback on their performance, and reflecting on their experiences using the insights they glean from the data. Embedded in this theory of change are the following assumptions:

1. Whatever forms of performance people measure captures their attention.
2. When educators set up student interactions that involve measurable goals, they have a choice whether to set goals on a win-lose basis or a win-win basis.
    - If the standard of success for students – whether organized individually or in groups – is measured by win-lose performances, then students will tend toward win-lose behaviors.
    - If the standard of success for students is measured by win-win performances, then students will tend toward win-win behaviors.

- Educators may attempt to set up educational goals on an individual basis, but people are social and students tend to gravitate into groups and commonly make social comparisons between groups and between individuals.

3. Educators who set win-win goals for their classrooms and measure progress toward those goals by measuring cooperative performance, increase their success and the success of their students if the educators empower their students to make choices frequently and freely.
    - Teachers can empower their students to make free choices by setting goals, creating games with written rules for scoring goals through collaboration between different sides, and then leaving students free to be creative in reaching the goals.

Whether these assumptions will be supported or refuted remains to be seen. One approach to this issue is to interview teachers who use games that keep score of cooperative performance, such as EnTeam games, in their classrooms. If teachers perceive that EnTeam games have the effects anticipated in Figure 3, teachers can be expected to be able to describe the impact on their students. In addition to the impact on students, games that keep score of cooperative performance may have impacts on teachers because if students behave more respectfully to each other, fight less, spend more time on task, and learn more in consequence of using EnTeam games, then teaching may be less stressful and more enjoyable.

EnTeam logic model. A logic model describes both the means that an intervention uses and the results that the intervention achieves (Phillips, 2004). A logic

model is based on a theory of change (Brest, 2010) such as the concept model presented above.

The EnTeam logic model aligns with the EnTeam theory of change: games that keep score of cooperative performance will increase productivity and peacemaking if educators use the games as a medium for helping students understand collaboration by studying together. EnTeam games give students experience in measuring cooperative performance that fosters a mindset of positive interdependence in contrast to win-lose games that foster a mindset of negative interdependence.

Table 2 Logic model for EnTeam process

Inputs	Activities	Short-term effects	Long-term effects	Impact
Concept games that develop the thinking skills that align with the learning objective. Guidelines for facilitating the reflection on the games. Procedures for scoring cooperative performance. Manuals for professional development workshops.	Workshops for teachers to develop skills facilitating concept games and debrief them. Facilitator support for teachers leading concept games with students.	Teachers can use games to foster character development of students	Teachers see students treat each other with respect and make moral choices when faced with dilemmas.	Peacemaking increases due to gains in moral character: less cheating and belittling, greater skills in resolving conflicts and solving problems.
Content games that align with the learning objectives teachers set. Procedures for creating new content games for other learning objectives. Procedures for facilitating student reflection on the games and the scores.	Workshops for teachers to develop skills facilitating content games and debrief them. Facilitator support for teachers leading content games with students.	Teachers can use games to foster academic achievement of students	Teachers use cooperative learning consistently and with fidelity. Students help each other master curricular content.	Productivity increases due to gains in performance character: higher engagement, efficiency, persistence, industriousness, trustworthiness.

Table 2 is a logic model that summarizes the benefits or gains from implementing EnTeam games and the hypothesized changes in the effects and impacts that could be produced if teachers use games as depicted in Figure *5* and Figure 6 – see page 74 below.

The question remains whether the logic model matches with the experience of teachers in the classroom. Although prior research on EnTeam games is limited, a few studies that have been conducted are described below.

Prior research on EnTeam games. The use of EnTeam games has been tested and analyzed in a few settings. A qualitative study examined *Operation Cooperation*, an EnTeam program for Muslim, Jewish, and Christian schools in St. Louis that started a few weeks after 9/11/2001 (Neufeld, Wohlfarth, & Rinder, 2011). Operation Cooperation has operated in a consistent format of interaction among faith-based schools since 2002 although the schools have gone through changes in administration, divisions, mergers and replacements. The format of Operation Cooperation is that each school has one turn during the year hosting third-grade students and their parents and teachers from the other three schools, and therefore students and educators experience Operation Cooperation four times during the year.

The study consisted of a series of interviews of parents and teachers who co-facilitated Operation Cooperation events and middle school and high school students who had participated in Operation Cooperation when they were in third grade. The research examined whether a two-hour intervention that occurs only four times with students in third grade has any lasting impact on the beliefs, values, and behavior of children, their teachers, and parents. A total of 35 interviews were completed, but two were not included

due to insufficient documentation. Of the 33 interviewees, 14 were adults and 19 were youth.

The study used the methodology of grounded theory and found consensus on four categories[3]. The most frequent responses from parents and youth centered around the message that because of Operation Cooperation "youth gained respect and open-mindedness about others who are different from them…Parents appeared to highly value these attitudes. They particularly noted (and with high regard) that children became more comfortable talking and interacting with students from other religious schools during Operation Cooperation" (Neufeld et al., 2011, p.14). The type of EnTeam games used during the Operation Cooperation events include games described in Appendix A. A comment from one sixth-grade teacher is salient: he said that he could identify which sixth-grade students had attended Operation Cooperation in third grade because the participating students tended to be more open to ideas proposed by people of other faiths and less quick to make judgements against other faiths.

A second study of EnTeam games analyzed the levels of academic achievement when a teacher taught without EnTeam games and later with EnTeam games. This study compared the state science-test scores for two groups of students before and after their science teacher participated in EnTeam professional development (Gilsinan & Wodzak, 2015):

[3] The four categories were (1) Youth gained respect and open-mindedness about others who are different from them (2) Operation Cooperation was enjoyable and engaging for youth, with collaboration and cooperation in problem-solving (3) Most parents indicated they would have liked to hear more about the children"s experiences in Operation Cooperation and (4) Almost all youth and parent interviewees recommended offering an additional Operation Cooperation session(s) for students in higher grades.

- The intervention group: 191 students in 8th grade science at School X were taught using EnTeam academic games that encourage students to study collaboratively (classes with EnTeam educational games) for two school years and were tested on the Missouri Achievement Program (MAP) in 2013 and 2014.
- The comparison group: 157 students in 8th grade science at School X were taught with traditional whole-class instruction (classes without EnTeam educational games) for two school years and were tested in 2011 and 2012.

The same eighth grade science teacher (identified by the pseudonym "Ruth" and quoted in Chapter 3 of this study) taught all the students at School X whose scores on the Missouri Achievement Program tests were the focus of the study. During the two school years 2010-2011 and 2011-2012 Ruth taught without using EnTeam games. During two school years, 2012-13 and 2013-14, Ruth taught all eighth-grade students at School X, but she taught using EnTeam games. Ruth had been teaching for over ten years and began teaching with EnTeam games in fall 2012.

The results show the percent of students who were advanced and proficient at School X compared to the entire school district. The pair of light-color bars on the left compare percentages for all eighth graders in the school district tested in the years 2011 and 2012 with the percentages for the following two years. The dark-color pair of bars on the right show comparable percentages for all eighth graders in Ruth's classes. The data show that test scores increased in the years that the students at Ruth's school studied together using EnTeam games, 2013 and 2014.

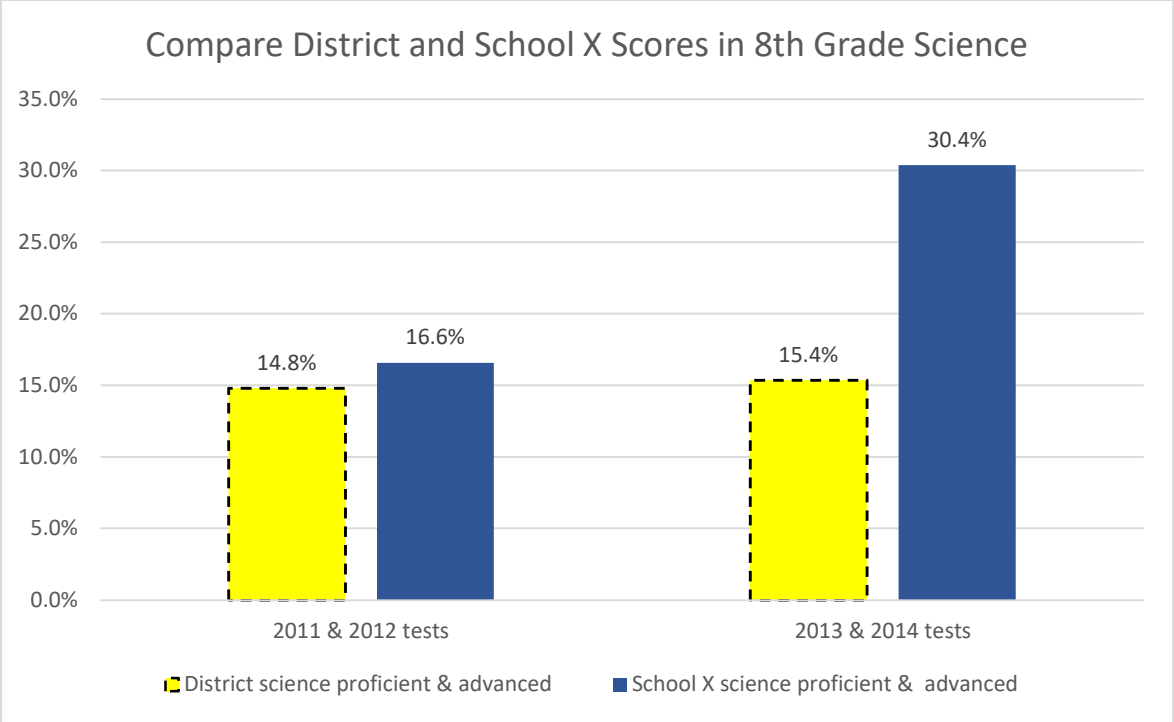

Figure 4. Test score results comparing students who studied without using EnTeam games and students who used EnTeam game in eighth grade science classes

The bar chart in Figure 4 shows the percent of students who scored in the proficient or advanced levels on the state test in eighth grade science in the school district that includes the intervention school (identified as School X).

The comparable MAP test scores in math and English language arts for eighth grade students at School X showed no significant change during the years in question.

This study has design weaknesses and many factors may have influenced test scores. Additional studies will be needed before drawing conclusions about causation.

A third source of data assessing the impact of EnTeam programs comes from teacher feedback following demonstration lessons conducted in their classrooms when an EnTeam representative co-facilitates an academic lesson with a teacher. The purpose of these demonstration workshops is to show teachers how students respond to EnTeam games and to prepare teachers to use EnTeam games independently without a facilitator

present. After the workshops, the teachers can indicate whether they agree or disagree with a set of statements:

Table 3 Teachers' responses to a survey following professional development in their classrooms 2012 2017.

Do you agree or disagree with these statements?	Agree strongly	Agree	Disagree	Disagree Strongly
1. Students enjoyed participating in the EnTeam activities.	20	36	2	1
2. EnTeam activities can support the academic goals I have for my class.	28	28	1	2
3. EnTeam activities help students learn to work together.	27	28	2	2
4. The EnTeam facilitator was effective in working with the class.	29	30	0	0
5. I see value in the EnTeam process of measuring cooperative performance.	26	25	5	1

Data in Table 3 are based on a one-page evaluation (included in Appendix D) that teachers filled out following the use of an EnTeam game in a professional development workshop with students in the classroom with an EnTeam facilitator present. Although the responses are positive, the number of teachers who continue to use the games as pedagogical tools is an open question that will require additional research.

By interviewing teachers who have experienced EnTeam games with students in the classroom it may be possible to gain a deeper understanding of the perspective of the teachers and thereby gain insights that lead to improvements in the games and develop plans for future research.

Research questions

As stated in the introduction to this study, the purpose of the research is to learn whether educators perceive that teaching academic subjects with games that keep score of cooperative performances between students facilitates character development and boosts academic achievement. Hence, the following research questions that guided the empirical study:

When teachers use games that keep score of cooperative performance, what effects on students' character and academic performance do teachers attribute to the games?

What challenges or benefits do teachers see in using games that keep score of cooperative performance?

The approach for answering these research questions involves interviewing teachers who have experienced the use of EnTeam games about their observations when their students play academic games in the classroom. The procedures for introducing teachers to EnTeam games and then interviewing those who have experience with EnTeam games in their classrooms are presented in the following chapter.

Chapter summary

This first chapter opened with the statement of purpose: learn whether educators perceive that teaching academic subjects with games that keep score of cooperative performances between students facilitates character development and boosts academic achievement. To progress toward this objective, the literature review took five steps. First, terms were defined including a distinction between win-lose games and win-win games. The second and third steps clarified the difference between competition and

cooperation using social interdependence theory and its application in education in the form of cooperative learning. The fourth step approached cooperation and competition from a different point of view – game theory – to facilitate the quantification of cooperation. The final step unified the perspective players gain of one another during a game while they are gathering feedback data on their performances and after the game when they can reflect on their experience together and the moral implications of their treatment of one another.

At the end of the five steps, a conceptual framework for EnTeam games was presented along with the available research on EnTeam games. Finally, two research questions were presented. The next chapter describes how teachers have been introduced to the process of measuring cooperative performances in the classroom and the process for interviewing them.

Chapter 2: Intervention and Research Method

As explained in the introduction to Chapter 1, the purpose of this research is to learn whether educators perceive that teaching academic subjects with games that keep score of cooperative performances between students facilitates character development and boosts academic achievement – and whether teachers see challenges or benefits when using games that keep score of cooperative performance. This chapter describes the research process that utilized interviews with teachers who have been introduced to EnTeam games by the author and other EnTeam facilitators. The process the facilitators used for introducing teachers to EnTeam games is described first, then the interview process is explained, followed by the process for transcribing, organizing, and analyzing the data. The chapter concludes with limits on this research.

EnTeam Professional Development as an Intervention

The literature review in Chapter 1 concluded with the assertion that there is a lack of research, other than the EnTeam studies, regarding the use of academic games that keep score of cooperative performances in schools. If this assertion is accurate, how can researchers study the effects of a process that is novel and for which there are no data that could be used for comparison and verification? The author's answer has been to find teachers who are willing to try using EnTeam games and give feedback on their trials.

Since 1995, the author has conducted literally hundreds of workshops in classrooms with teachers and their students to learn about the effects produced by games

that score cooperative performances. The present study provides a structure for the first systematic research project examining teachers' perceptions of the workshops.

A few hundred educators have been introduced to EnTeam games through workshops in public and private schools, both elementary and secondary, in Missouri and Illinois since EnTeam Organization, a non-profit organization, was founded in 1995 by the author. Additional workshops have been implemented in other states and a small number of workshops have been conducted in colleges and universities. Similar workshops have been used for educational purposes in community agencies and businesses.

These EnTeam workshops were conducted by the author or others who are experienced in leading EnTeam games. Some of the workshops were in the traditional structure for professional development: a presentation for adults without student participation. The author is skeptical about the efficacy of this adult-only format, therefore most of the workshops have been conducted in an alternative format: In-Class Professional Development (ICPD) which takes place in classrooms with students doing a cooperative learning activity co-facilitated by the teacher and an EnTeam facilitator. ICPD is explained in Appendix B.

Facilitators of ICPD workshops need to understand and be willing and able to use the EnTeam professional development process: the research starts in the classroom with the facilitator working with the teacher to incorporate EnTeam games into the service of the curricular content. Over the years of conducting ICPD in classrooms, the author has experimented with numerous approaches, but they all have a defining element: a cooperative learning activity with one of the EnTeam scoring processes in which

different sides win together or lose together by striving to improve their collaborative performance. Mastering this process is essential for EnTeam facilitators.

The purpose of EnTeam professional development is for the teachers to learn ways to raise academic achievement while teaching students how to achieve goals collaboratively with each other – especially with people they might not work with ordinarily. The objective of ICPD is to create a mindset that encourages win-win relationships among students.

To achieve this purpose, the author and other EnTeam facilitators have conducted demonstrations in the classroom by collaborating with teachers to engage students in playing together with the subject they are studying. Typically, teachers are invited to use EnTeam at a staff meeting where the school principal asked the teachers if any of them would like to try a unique form of cooperative learning. The facilitator explains that EnTeam games are one of many forms of cooperative learning. One benefit for teachers is that EnTeam games enable them to assess the individual performances – both academic and cooperative performances – of students when they are working together with other students.

After the introduction to the staff, the next steps typically are as follows. The teachers who volunteer, schedule an individual meeting with an EnTeam facilitator; in the meeting, the facilitator asks six questions:

1. What is an upcoming topic that you would like to teach in a cooperative-learning format?
2. What are your learning objectives for that topic?
3. How will you assess mastery of the learning objectives?

4. What are the behavioral objectives you would like your students to exhibit?
5. How will you assess attainment of the behavioral objectives?
6. Would you like the facilitator to demonstrate the lesson with one section of students during the school day? (This final question can be modified depending on whether the teacher has multiple sections of the same subject.)

With the answers to these six questions, the facilitator has the necessary information to propose a workshop aligned with the objectives.

While the details of the workshops conducted with the teachers interviewed for this study differed depending on the answers to the six questions, the general structure was consistent with the procedures described here.

After considering the teacher's answer to the six questions, the facilitator proposes a pair of games that might fit with the objectives that the teacher identifies. If the teacher agrees with the facilitator's suggestion, the teacher and the facilitator schedule a time for the workshop. The role of the teacher during the workshops is determined by collaboration between the teacher and facilitator. Typically, the teacher observes as the facilitator leads the first group of students in playing a pair of EnTeam games. The facilitator and teacher may co-facilitate if there is a second group of students. The workshop should give the teacher the information needed to understand and use pairs of games independently.

The pair of games starts with a *concept game* that engages students in using the thinking skills that pertain to the curricular content that the teacher set as the goal for the students to attain. These thinking skills can be cultivated through EnTeam concept games – physical sports and table games that are designed and coached to nurture in players a

specific mental process relevant to learning objectives set by the teachers. Examples of these games are presented in Appendix A.

The essential point is that the concept game involves no academic content because the initial objective is to cultivate the mental skills required by the academic game that will be introduced after the students master the relevant cognitive capacities together. For example, these thinking skills include memorization and recall, comprehension, comparison, analysis, evaluation, synthesis, application to problem-solving (Marzano et al., 1988). Once students gain success with the thinking skill, then the teacher can engage the students in playing many different content games that use the same thinking skill as the concept game to master many areas of academic content.

Second, after the students play the concept game and keep score of their cooperative performance using the thinking skill relevant to the curricular content, they play a *content game* that engages the students in applying the thinking skill to the curricular content[4]. When sports and non-academic games are intentionally formatted for players to apply and explore the essential thinking skills such as analysis, evaluation, and synthesis, then the classroom teacher – if the teacher is prepared properly – can assist students in applying these thinking skills to academic subjects such as algebra, geometry, languages, sciences, and philosophy.

Games that use specific thinking skills and combine both a physical activity and academic content can be organized into one package. For example, one of the learning

[4] Note that the facilitator is not teaching the curricular content. During the workshop, the facilitator is only addressing the learning process. Of course, it helps if the facilitator is knowledgeable in the subject area, but this not requisite. For example, the author successfully demonstrated how to engage students in reading and interpreting passages in Arabic using an EnTeam game although the author knows no Arabic. The Arabic teacher provided the substance of the teaching while the author facilitated the collaboration among the students and the measurement of their cooperative performances.

objectives identified by some of the interviewed teachers was for students to be able to show changes in speed and direction using linear functions. One of the games used to achieve this learning objective was *Robot Control Game* (presented in Appendix A). This game develops the thinking skills needed to study together and master these interrelated concepts of algebra and physics. The students set up patterns for running and walking during the same class periods when they are studying math in the gym. This sequence of learning experiences is summarized in the following flowcharts.

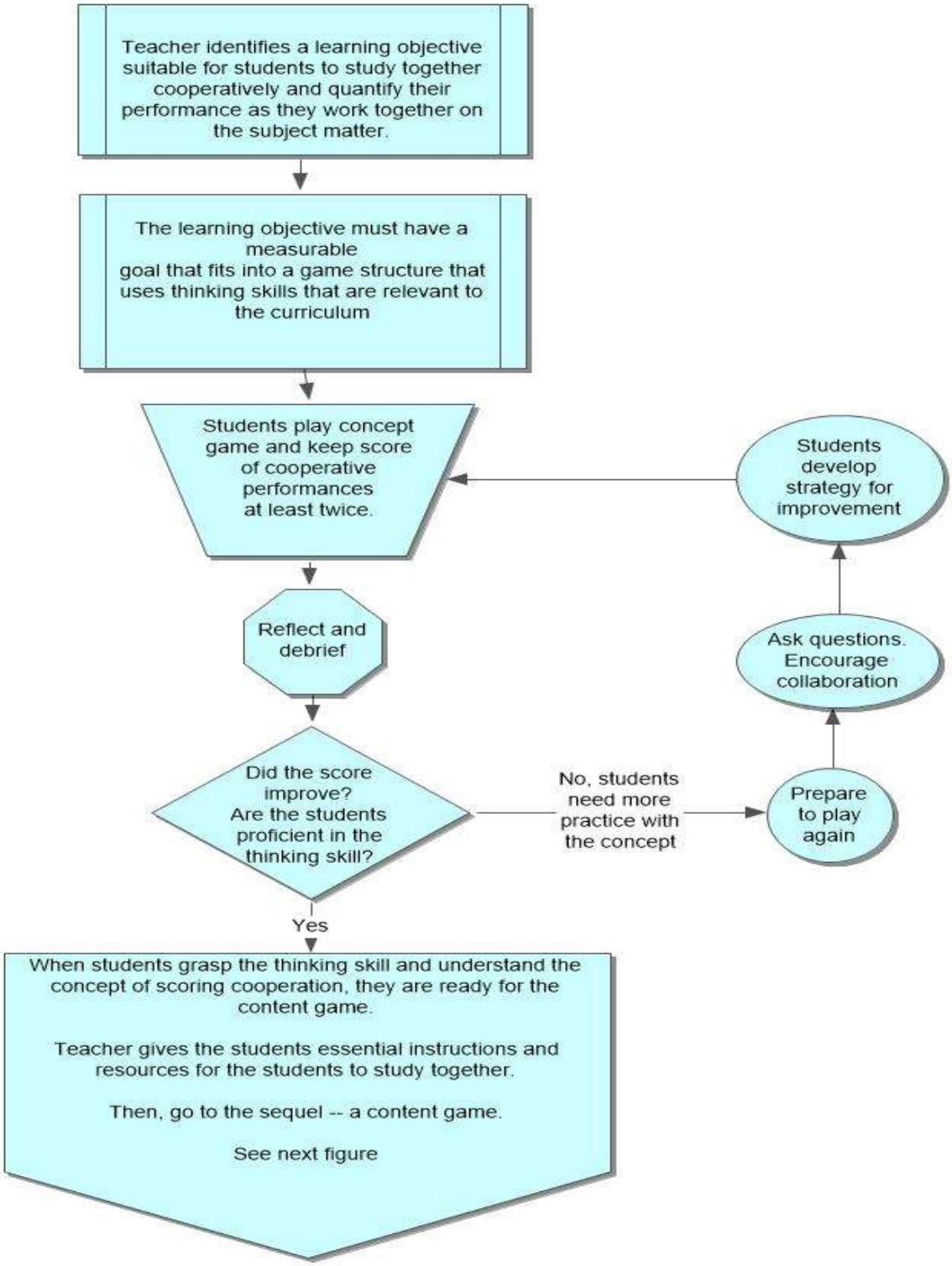

Figure 5 Flowchart for EnTeam concept games leading to the academic concept game.

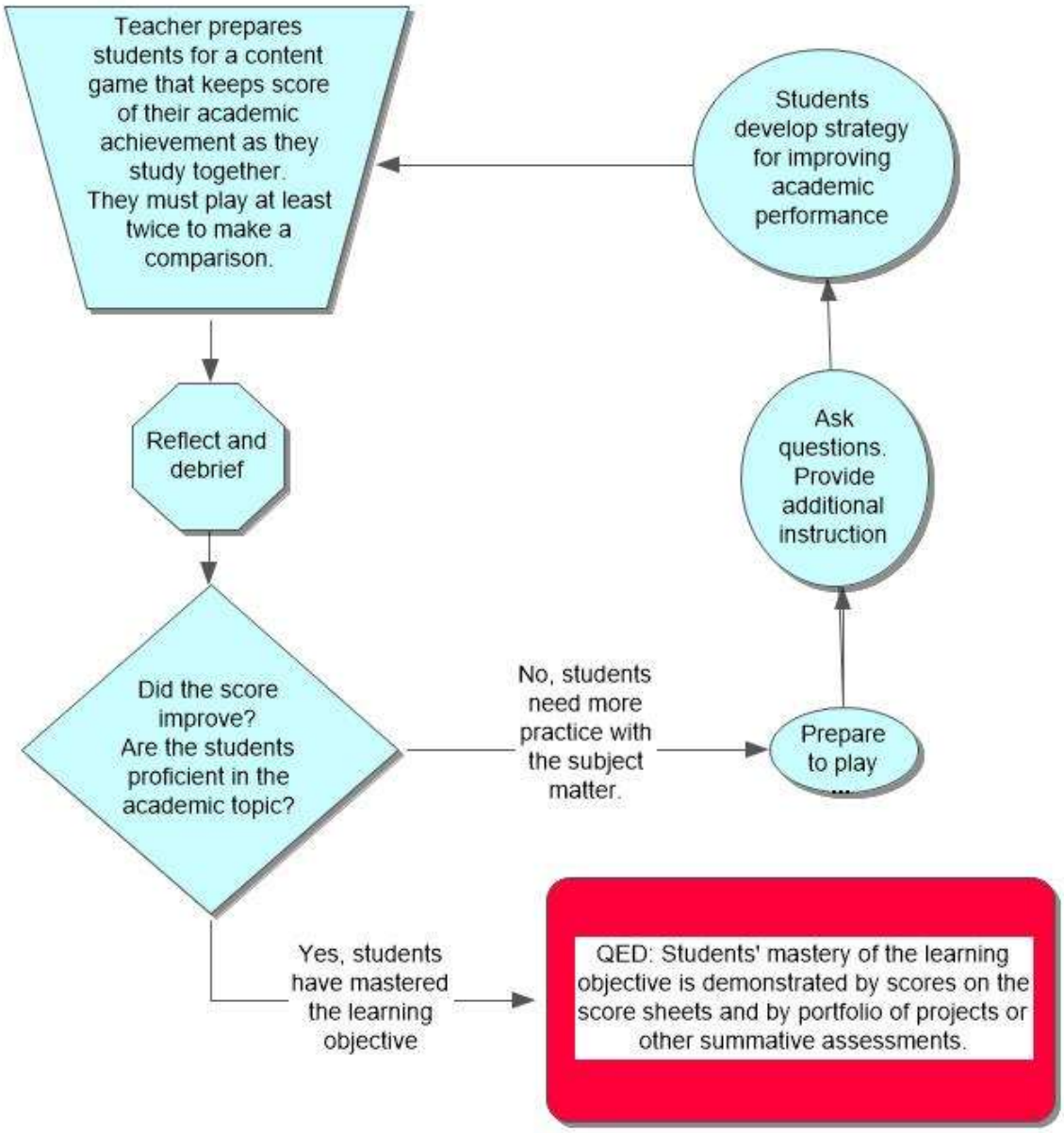

Figure 6 Continuation from Figure 5 into the flowchart for the academic content game

Together, Figure 5 and Figure 6 above depict the sequence of a matched pair of games that require similar thinking skills. Teachers can use this two-step sequence to measure cooperative performance and academic achievement for any curricular content whether the students are expected to memorize vocabulary, compare alternative approaches to a problem, comprehend the meaning of a story, analyze phenomena they

observe, create a new approach to conflict, evaluate a case, or a combination of thinking skills. The steps for this process and examples of pairs of games are described in more detail in Appendix A.

Introduction to the measurement of cooperative performances. Before a facilitator can lead workshops introducing teachers to the use of EnTeam games, the facilitator must understand how to keep score of cooperative performances. The details of this process are explained in Appendix A, but at its simplest level, the score for win-win games is comparable to the score of win-lose games: how many goals can players score.

In traditional win-lose games, such as baseball or tennis, the score is not simply a measure of competitiveness of the players. Other factors, such as skill, previous experiences, motivation, playing conditions, and random chance influence the scores. Likewise, in win-win games the score does not measure cooperativeness only. Players in win-win contests could be fully cooperative and still lose if their scores do not improve in a series of games because other factors may work against them. For example, skill, previous experiences, motivation, playing conditions, and random chance influence the scores in win-win contests just as they do in win-lose contests.

Therefore, professional development should include the recognition that the scores do not measure cooperation exclusively. The facilitator must acknowledge that the numbers on the scoreboard are a blend of forces at work during the game including skill, learning, cooperative spirit, and random variations. Because multiple factors interact to determine the score, it is important not to attribute changes in the score only to cooperation. This complexity in interpreting scores in win-win events is parallel to the complexity of interpreting scores in win-lose events where the score is determined by a

combination of factors including skill, learning, competitive spirit, and random variations.

Debriefing and reflection during the professional development provide opportunities for educators to explore these issues with the players from different sides.

Reflection and debriefing. As was pointed out in Chapter 1, the heart of learning according to the philosophy of experiential education is in pausing to make sense of the experience. The facilitator leading ICPD must give the students time to gather data from the scores and interpret those data. Without reflection, little learning takes place.

One of the structures for organizing the debriefing process that was used frequently with the teachers interviewed for this research process is to ask three simple questions to encourage reflection:

1. What happened?
    a. Gather data about the experience during and after the game.
    b. The data include the scores as well as observations about what strategies and tactics worked and did not work when they were playing the game.
    c. Ask the players to organize the data into categories that are useful for analysis and synthesis.
2. So what?
    a. Analyze the data to identify lessons from the experience.
    b. Look for principles that are at work.
    c. Consider ways to generalize from the past games to future games.
3. Now what?
    a. Use the analysis to synthesize new approaches to the next game.

b. Identify how to improve the score because if the score does not improve everyone will lose.

Reflection using these questions was facilitated in the classrooms of the interviewed teachers three ways: individually by journaling, in small-group discussions with written questions that the students discussed, and large group or whole class discussion. Additional details about debriefing are include in Appendix B.

In debriefing concept games and content games, some of the essential concepts are revealed by contrasting alternative conceptions of winning and losing.

Alternative conceptions of winning and losing. Facilitators must prepare teachers to distinguish variations in the concepts of winning because of significant differences in the structure of scored games and the choices available to educators when they are planning lessons.

In the ICPD workshop, the facilitator points out that Merriam-Webster defines the intransitive verb "win" in two ways: "(1) to gain the victory in a contest and (2) to succeed in arriving at a place or a state." Games built on the first definition of winning require a win-lose contest between two (or more) sides and a form of score keeping that makes a comparison of either the number of goals achieved by the different sides or the relative performance of different sides to determine which side won and which side lost (Wohlfarth & Stevens, 2003). Games built on the second definition of winning – success in arriving at a place or a state – allow for collaboration between groups of people and open the way for winning by increasing the number of goals two sides can achieve together in a series of iterations of play (Wohlfarth & Stevens, 2003). The latter definition is the one used by EnTeam games.

When the facilitator is planning the games to propose to the teacher, the facilitator must consider the following criteria to identify contests as either win-lose or win-win. Also, the facilitator must be prepared to explain these criteria to the teacher when they have the time and inclination to plan their own lessons using EnTeam games:

1. Challenge – Does the event pit people versus people **or** people versus problems?
2. Score – If one side achieves its goal, does the other side benefit?
3. Skill differential – Do the different sides need to be approximately equal in skill and ability?
4. Iterations – What is the minimum number of games needed to determine who wins?
5. Information – Do players benefit by communicating thoroughly and accurately with people on the other side – or do players benefit by withholding information or giving false information or intimidating information to the other side?
6. Assistance – Do people on one side benefit by sharing resources or constructive recommendations regarding performance with people on the other side?

The following table shows teachers the contrast between EnTeam win-win games and traditional win-lose games. The facilitator must be able to apply these criteria to distinguish games and to explain the benefit of EnTeam games to teachers.

Table 4 Contrast between win-lose and win-win in two-sided contests

	Win-lose	**Win-win**
Challenge	Contest is between **people** who are on opposing "sides." One side endeavors to outperform or dominate over the other side. One side can win only if the other side loses.	The contest is against a **problem.** People from both "sides" are united against the problem. Players from different sides work together against impersonal challenges such as time, distance, fear, ignorance, disease, or other problems in interpersonal relations. The contest is not against people.
Score	If one side achieves their goal, the other side does not benefit. The scores show who is the winner and who is the loser.	If one side achieves their goal, the other side also benefits. The scores show progress in the collective effort toward achieving compatible goals.
Skill differential	Players need to be reasonably close in ability or skill level for the contest to be meaningful because the score measures whose performance is best.	Players can be extremely different in ability and the contest can still be meaningful because the score measures whether their combined performance improves each time they play together.
Iterations	One game can be sufficient to determine which side is the winner and which side is the loser.	At least two games are required to determine whether both sides win or both sides lose.
Information	Players on one side may benefit by withholding information or giving misleading information (such as a bluff or fake) to the other side.	Players on both sides benefit by giving the other side accurate, comprehensive information.
Assistance	Helping or sharing with one side hurts the other side. (For example, helping the other side in war games is treason.)	Helping one side increases both sides' chances for success.

Table 4 depicts cooperation as a win-win relationship based on positive interdependence – a relationship among individuals who have compatible goals. During professional development, the table can be used to explore ways to transform win-lose contests into win-win relationships. For the sake of simplicity, the table uses two-sided contests, but generalizing to a multi-sided contest does not change the conclusions or implications – at least, so far, no one has identified any inconsistency.

A win-win relationship does not require that all goals be compatible. A useful analogy is the relationship between a buyer and seller. They have contrary goals regarding price (because a seller benefits from a high price and buyer benefits from a low price), but they can have a win-win relationship if they share the goal of achieving a fair deal – especially if they want to continue to do business together in the future (Stevens, 2008). In win-win relationships, people from different groups or sides see ways that by working together they can achieve their compatible goals individually and collectively: success for one side regarding their compatible goals increases the probability of success for the other side also. In win-lose relationships, success for one side decreases the probability of success for the other side. Examples of win-win scored games for the classroom are presented in Appendix A.

The scoring process in win-lose contests as they are defined in *Table 4* above is based on negative interdependence: a relationship among individuals who can only achieve the goal measured on the scoreboard if the other person (or group of people) fails to achieve her/his goal. Success for one side increases the probability of defeat for the other side.

As the participants in professional development compare win-lose events and win-win events, another essential point is that performance in win-win competitions can be measured objectively on scoreboards.

Alternative conceptions of competition. The demonstration of EnTeam games in ICPD workshops must include at least one of the following forms of competition. Both forms of competition were demonstrated during professional development for the teachers who were interviewed – although, in some cases, the introduction of the second form was limited.

Competing to improve. The form of win-win competition that is easiest for teachers and students to understand is called *group-best competition* and has some parallels to personal-best performance that is common in individual sports in which individuals strive to exceed their previous-best performance. In group-best competition, two (or more) groups strive to improve their scores in an event that requires collaboration between the groups to score goals. For example, two volleyball teams could play a series of games (described in Appendix A) in which they make repeated attempts at increasing the number of goals they can score together in a revised form of volleyball that requires collaboration between the teams.

In each game they play, the teams are striving to improve on their previous performance; the comparison groups are the same groups of people at two different times. They determine whether they win or lose by comparing their combined scores each time they play. Similarly, individuals can follow the same process of comparing the scores they achieve in a series of contests in which they score a point only when the individuals work together. For example, pairs of students could strive to improve on their previous

performance in solving two-part math problems if one partner must solve one part of the problem and the other partner must solve the second part. Partners may talk, but neither may do the other's work. They win together if their combined score improves game after game. They both lose together if their combined score does not improve after each game. (Further details about academic games are included in Appendix A.)

The essential point is that competition to improve on previous performance is a type of social comparison that is fundamental to the EnTeam professional development. The comparison of a series of scores allows the players to see which strategies and skills produce the most rapid rates of improvement. In this case, it is useful to identify the resistance to innovation as one of the challenges the players must overcome – and during the ICPD workshops the facilitator's assignment is to help the teacher encourage their students to innovate when working on the curricular content such as math problems, for example.

The salient concept for professional development is that competition requires a contest. Unless there is risk of losing and some form of challenge or problem to overcome involving a comparison, there cannot be a contest. If the opponents or problems are identified as people, then the competition is defined for EnTeam professional development as *interpersonal competition*. If the challenges or problems are identified as something other than people – such as time, distance, fear, racism, disease, corruption, ignorance, tornadoes, or previous performances – then the competition is defined for EnTeam professional development as *impersonal competition*.

The rationale for distinguishing between interpersonal competition and impersonal competition is that skills in bringing together groups of people who have been

antagonistic toward one another and then measuring how well they can do at working together in opposition to impersonal problems that may have compounded their animosity – or even been the cause of their disharmony – are skills sorely needed in schools and in society. Scoring systems such as group-best scoring of competitive performance enables people to quantify cooperative performances and the act of achieving goals with players on the other side. This principle of measuring the ability to maximize the performance of others is also relevant to the next example of competition.

Competing to bring out the best in each other. During professional development, participants may experience another form of competition that diverges from traditional conceptualizations of competition and that can serve teams of players with significantly different skills.

In traditional win-lose sports such as tennis and football or academic games such as spelling bees and debates, it is axiomatic that contests between players with vastly different skill levels are unfair contests or non-contests. However, if two skilled teams compare scores of their performance in a challenge that requires cooperation between skilled teams and unskilled teams, the contest can be useful because the skilled teams can learn how to bring out the best in the unskilled teams. (Tracking this form of competition can be facilitated by the *All-for-One* score sheets presented in Appendix A.)

For example, one of the approaches the author developed during ICPD workshops with an interviewed teacher involved eighth-grade students earning scores in repeated games that requires cooperation between one eighth-grade student and sixth-grade students. This type of contest gave the older students data they could use to see which strategies were best at bringing out the best in the younger students.

In this competition, it is not necessary for the skilled players to play with one another. It is sufficient if they only play with the younger students. The contest is to see which of the older students use strategies that enable the younger students to improve most rapidly.

In other words, competition as defined for EnTeam professional development also includes social comparisons between high-performing players in collaboration with lower-performing players in competition to see whose approach is most effective at accelerating the development of lower-performing individuals. In a series of games, data show the rate of improvement of the lower-performing players. In this case, the measure is the number of goals that various people score in events in which players can increase their score if they share strategies openly and accurately. This form of competition can be interpreted different ways: people against people or strategy against strategy. In other words, the older students may be in a win-lose contest against one another. An alternative interpretation of the competition is that the strategies used by the older students are in competition. A more productive use of the data is possible when all of the scores are combined after each round of games and all of the players – both experienced and novice – are given opportunities to develop strategies and tactics for improving the total score in the next round of games. In other words, combine all-for-one scoring with group-best scoring.

One motivation for defining impersonal competition as described in EnTeam professional development is that a broader definition has the potential for increasing capacity of highly-skilled performers for bringing out the best in less-skilled or novice performers. All-for-one competition is impersonal in the sense that the high-performing

players do not need to play a game with each other. Their win-lose competition can be accomplished simply by playing with the novices.

While it is frequently observed that a somewhat stronger team can draw out the best in a less experienced team, all-for-one competition has at least two significant differences. Keeping score of the ability of the high-skill performers to strengthen the less-skilled performers provides data that can be used in the debriefing process to compare and analyze results from alternative methods to improve future efforts of the pairs and the combined performance of the different sides as a whole group. Also, a wider range of performers can engage together, thus opening the possibility of greater participation by more people – including those labeled disabled or disadvantaged.

Scoring cooperative performance and the free-rider problem. After teachers have mastered the basics of scoring cooperative performance, they are ready to quantify individual performance of students who are working together. Teachers who do not experience using the scoreboard do not see the way that the free-rider problem (described on page 28, and further addressed in Chapter 3 beginning on page 111 and Chapter 4 page 163) could be overcome using the EnTeam scoring process. When the teachers play the game and experience how to keep score of each individual student's performance in collaboration with other individual students, the teachers may see how they can give individual feedback. Also, the teachers may see how to give grades for each individual student when they are in cooperative-learning lessons. (For more details, see the score sheets in Appendix A.)

Teachers who have experienced ICPD with a facilitator were asked to share their perceptions of the impact on their students from learning academic lessons using EnTeam

games. Also, the facilitators who worked with the teacher and the students in the classroom gained insights by observing and interacting with the teachers while planning the ICPD workshops and during the workshops in the classrooms with the students and teachers. Since the author is one of the facilitators and he worked with the teachers for months – and in some cases – over a year, he has insights that go beyond the data conveyed through the interviews.

Research Methods

The research process requires teachers who experienced the ICPD process described above.

Sampling and participants. The method for selecting the educators interviewed for the present research is *purposeful sampling* which involves selecting sites and individuals to be included in the study targeting those who are most appropriate and relevant to the research (Merriam & Tisdell, 2016). The members of the advisory committee suggested limiting this research to teachers with the following similarities: secondary school teachers of STEM subjects (science, technology, engineering, and mathematics) who experienced EnTeam ICPD in their classrooms during the past five years. (Five of the interviewed teachers self-reported that they continued to use EnTeam games after their ICPD, but no verification of those claims was made.)

With this advice, the author reviewed the records of EnTeam professional development workshops and identified 54 secondary-school teachers who experienced EnTeam games by means of individual workshops held in their classrooms with their students present. He narrowed the list to 20 STEM teachers who had experienced

multiple workshops. He telephoned all 20 teachers to ask if they would take time to be interviewed for the present study. Of the 20 he called, he reached 15. Two of the 15 said they did not want to be interviewed. The other 13 agreed to be interviewed and recorded. After a pilot interview was successful, ten interviews were conducted. Two of the teachers who agreed to be interviewed apparently changed their minds or decided they did not have sufficient time for the interview because they did not reply to repeated attempts to schedule their interviews. (The pilot interview was not included in the analysis because the teacher participated in ICPD over fifteen years ago and retired over ten years ago.)

All the teachers interviewed for this research experienced ICPD, however the length of participation varied widely: the minimum for the teachers interviewed was four workshops. The teacher who had the most ICPD experienced over 20 workshops – many of which involved experimentation and development of new games. The workshops varied in length depending on the length of the class periods in the school and the topic being addressed. Most of the workshops were over an hour in length because all but one of the schools involved in the research were on block schedules.

Table 5 below summarizes core demographics for the teachers interviewed, each of whom is a secondary-school teacher in an area of science, technology, engineering, or math subjects (STEM) and serving in public schools:

Table 5 *List of interviewees' pseudonyms, subject areas, demographics, and characteristics of their schools*

Alias name	Subject area	Gender	Race *	IGU **	ICPD ***	Grade levels	FRL % ****	School location
Al	Design	Male	Eu-Am	No	6	11-12	17%	suburban
Rae	science-anatomy	Female	Af-Am	Yes	4	11-12	100%	suburban
Dee	science-veterinary	Female	Eu-Am	No	4	11-12	17%	suburban
Ed	science-veterinary	Male	Eu-Am	No	4	11-12	100%	suburban
Jan	science-general	Female	As-Am	No	~10	9-12	100%	inner-city
Kay	science-dental	Female	Eu-Am	Yes	5	11-12	17%	suburban
Lea	math-finance	Female	Af-Am	Yes	~5	9-12	100%	inner-city
Nat	math-general	Female	Af-Am	Yes	~8	9-12	100%	inner-city
Ron	science-general	Male	Eu-Am	No	~5	9-12	100%	inner-city
Ruth	science-general	Female	Eu-Am	Yes	>20	7-8	100%	inner-city

* Af-Am = African-American; As-Am - Asian-American; Eu-Am = European-American

** IGU = Independent Game Use refers to whether the teacher used EnTeam games independently of an EnTeam facilitator: yes means that after in-class professional development workshops with EnTeam games, the teacher self-reported that they continued to use EnTeam games on their own without the assistance of a facilitator from EnTeam Organization.

*** ICPD = The number of In-Class Professional Development workshops facilitated by an EnTeam facilitator with the teacher in the teacher's classroom with students participating.

**** FRL % refers to the percent of students from communities with incomes that qualify for free or reduced price lunch and who attend the school where the teacher taught when the teacher had EnTeam professional development.

All teachers listed in Figure 5 experienced at least four ICPD workshops in their classrooms within the past three years. The author facilitated ICPD workshops for nine of the ten teachers and therefore he had the insights gained by working closely with the teachers during the planning process before the workshops, observing the teachers during the workshops, and in the follow up discussions with the teachers after the workshops. Kay is the only teacher for whom the author has not facilitated a workshop.

Data Collection

The data were collected through semi-structured interviews. To reduce the effects of potential bias, the interviews were conducted by an independent interviewer familiar with EnTeam games and who was paid for her work. The interviewer has had 13 years of experience working with teachers coaching them to incorporate computer technology into classrooms. The author was not present during the interviews.

Before the interviews were conducted, the interviewer tested the questions by interviewing a retired teacher who had experienced EnTeam workshops in her classroom in the late 1990's and early 2000's. This pilot interview was on February 20, 2017; it went smoothly and gave the interviewer confidence that the questions were

straightforward and clear and would fit within the time teachers have during the school day.

The interviews took place in the schools where the teachers work. The dates of the interviews were between February 22 and March 9, 2017. The interviews were conducted during planning periods for the teachers. The audio-recordings ranged in length from 11.5 minutes to 24.5 minutes with an average of 19 minutes.

The interview questions. Questions for the semi-structured interviews are listed below. The interviewer also had a list of possible probes intended to elicit complete answers, if probes were needed. The probes are listed in Appendix C. The instructions to the interviewer were to listen for the answers to the questions and only ask follow-up questions if the teacher did not volunteer sufficient information without prompting. The interviewer was instructed to keep the interview open to follow the teacher's line of thinking and learn what the teacher perceived and felt about the impact of the games.

Interview questions for the semi-structured interviews:

1. How would you describe your experience with EnTeam games in your classroom?

   [If the teacher has led EnTeam games without a facilitator, skip to question 3 below.]

2. [This question is only for teachers who have **not** led EnTeam games independently (i.e. without an EnTeam facilitator present)]

   Why haven't you used EnTeam games on your own?

   [Skip to question 4.]

3. [This question is only for teachers who lead EnTeam games without an EnTeam facilitator present in the classroom.]

   Why have you used EnTeam games independently?
4. Regarding the development of character in your students, do you perceive any benefit or harm from using EnTeam games and debriefing the games? If so, how would you describe the effects on student's character from the games, the debriefing, and the scoring process?
5. Have you perceived any effect on the academic work of your students when you used EnTeam games? If so, how would you describe the effects of the games on students' academic achievement?
6. What are your intentions for using EnTeam games in the future?
7. What training in cooperative learning have you had?
8. Is there anything more you would like to say?

The process of interviewing teachers after they experienced ICPD reached saturation after five interviews in the sense that the results were recurring regarding the main questions. Saturation is defined as occurring when no new significant data are coming to light with further interviews (Merriam & Tisdell, 2016). Five additional interviews were conducted to confirm the repetition.

Data Analysis

The data from the interviews were analyzed using thematic analysis according to Braun and Clarke (2006) which consists of six phases. The first phase involved listening to each interview after the interviewer emailed it to the author. As he listened, the author transcribed each interview into a word processor, and then listened again to verify the

transcription. The method of transcription was orthographic, that is it included notation of laughter, pauses, and interruptions. The first transcription was typed when the recording arrived. The author began analyzing it before other interviews were completed.

After transcribing the initial interviews from the audio file into a word processor so the interviews could be read and initial impressions noted, the author considered whether there was any need to modify the interview questions. Since the author saw no evidence of problems regarding the questions or the interview structure, and the chair of Advisory Committee for this study saw no problem, the questions and the process remained consistent.

Most of the interviews were conducted using the structure of the interviewer meeting with the teachers one at a time. The eighth interview had a slight variation because two teachers participated in the interview together. The reason for this variation was that it was convenient for the teachers and the advisor for the research advised that a joint interview would not compromise the research process.

Coding. The second phase of the thematic analysis, coding, ran concurrently with the first phase. In other words, as soon as one interview was transcribed, the author began coding it before the rest of the interviews were completed.

The transcript was transferred from the word processor to a spreadsheet. The coding focused on patterns in participants' answers to the eight questions listed above. The interviews were analyzed by using the constant comparative method of data analysis by comparing one segment of data with another to determine similarities and differences (Merriam & Tisdell, 2016).

The coding process as described by Merriam and Tisdell (2016) begins with open coding for one interview to capture keywords differentiating features for each part of the interview. Open coding starts with reading the transcripts and identifying and labeling the ideas or issues that the interviewee apparently has in mind in their answer to each question. After reading each sentence, the main idea that the teacher voiced was noted as a code in the adjacent cell in the spreadsheet. After coding each interview in the spreadsheet, the author used the computer to group the codes and count how many matching codes appeared.

There were 664 codes in total generated from the interviews with the 10 teachers. Colleagues collaborated with the author in identifying the codes. Many of the codes were taken directly from the words spoken by the teachers (in-vivo codes). Other codes were shorthand versions of their ideas.

This phase was simplified using the computer to search the codes for themes. Since the codes and themes were entered onto the spreadsheet cells next to the lines of text, the author used the computer spreadsheet to cross-tabulate the codes, sort the codes, and make comparisons of different codes. Thus, the computer simplified the process of grouping and comparing ideas and finding patterns in the different interviews when identifying the themes and sub-themes.

Search for themes. The process of searching for themes is the third phase of thematic analysis (Braun & Clarke, 2006). In the present study, this search involved both an inductive approach and a deductive approach. The inductive approach started with the statements by the teachers and compared similarities in their views. Gradually the comparison process progressed toward generalizations that become themes. The

deductive approach started with preconceived concepts and searched through the transcripts looking for teachers' answers to the interview questions to find information pertinent to these concepts. These concepts were: scoring cooperative performances, character development, academic impact, social perspective taking, feedback, reflection, and moral reasoning.

Since the analytic approach took each answer by the teachers as a source of data, whatever the teachers said was examined to discover the meaning from the teacher's point of view. For example, none of the questions asked by the interviewer pertained to services for teachers; however, all ten of the teachers described ways EnTeam games served teachers during the workshops or could serve them in the future. Therefore, *teacher services* became one of the themes.

Among the list of services that the teachers mentioned, there were common elements. For example, one service that teachers attributed to EnTeam games was that teaching with the games made their work as teachers more enjoyable. Therefore, a sub-theme of teacher services is *teacher enjoyment*.

The deductive approach also used the statements by the teachers, but it involved searching for specific topical areas driven by the a priori expectation that the teachers would make comments relevant to the interview questions and thereby provide answers that pertain to the research questions. Since the research questions are focused on whether the EnTeam scoring process has any effect on students' character and academic performance, the author gave extra attention to the answers to questions four and five:

4. Regarding the development of character in your students, do you perceive any benefit or harm from using EnTeam games and debriefing the games? If so,

how would you describe the effects on student's character from the games, the debriefing, and the scoring process?

5. Have you perceived any effect on the academic work of your students when you used EnTeam games? If so, how would you describe the effects of the games on student's academic achievement?

By examining the answers to these two questions, the author could discern the teachers' opinion about the impact of the games on academic achievement and character development and identify challenges using the games as pedagogical tools. In some cases, the a priori search was fruitful. In other cases, such as the search for moral reasoning, the results were limited.

Reviewing and presenting themes. The fourth phase of thematic analysis includes a weeding process that eliminates superfluous candidates for themes (Braun & Clarke, 2006). Braun and Clarke (2012) define ideal themes as having well-defined scope, being related but distinct, and directly relevant to the research. For example, *professional development* was one of the candidates as a theme when it became apparent that eight of the ten teachers made comments about how much they enjoyed using the games. On further examination and review with the advisors, the author realized that the point the teachers were making in their comments were not relevant to professional development but rather to the support teachers appreciated from the introduction to using the games as teaching tools during the In-Class Professional Development workshops. The teachers added that they need support in the form of manuals that they could continue using and aligning the games to support their curricular content. Therefore, the theme *professional development* was weeded out and replaced by *teacher services.*

Naming themes is the fifth phase of thematic analysis and this process includes making a concise summary of each theme in a sentence or two (Braun & Clarke, 2006). These summaries are presented in the following chapter as part of the final phase of thematic analysis: reporting the data in the form of "…a concise, coherent, logical, non-repetitive and interesting account of the story the data tell" (Braun & Clarke, 2006, p. 93).

Researcher Perspective and Research Ethics

The author of this study is also the developer of EnTeam games as well as one of the facilitators who conducted the ICPD workshops with the teachers who were interviewed for this study. Since the author has been working on developing educational games that keep score of cooperative performance for over 20 years and has seen favorable outcomes, he has a bias in favor of these games. Unless this bias is candidly acknowledged along with the attendant dispositions and assumptions, the validity and reliability of the study will be undermined (Merriam & Tisdell, 2016). Therefore, these biases and beliefs are hereby acknowledged.

As noted above, an independent interviewer conducted the interviews; the objective for having an independent interviewer was to encourage the interviewees to feel more comfortable giving critical and candid answers to the questions.

To avoid a biased interpretation of the data after it was collected, the process of analyzing the data followed the professional standards of qualitative research as directed and reviewed by the chair of the advisory committee for this research.

To protect the participants in the research, names of the teachers have been replaced with pseudonyms. The research procedures were reviewed and sanctioned in

advance by the UMSL Institutional Review Board in compliance with Code of Federal Regulations (CFR) (45 CFR 46) as amended.

Limitations and Delimitations. One of the delimitations to the study (that is within the researcher's control) is limiting the teachers who were invited to participate in the research to those who volunteered of their own free will and were under no pressure from school administrators to participate. While this is an ethical requirement, it may also introduce a bias because volunteers are more likely to make a sincere effort to use the games with fidelity to the EnTeam process. Of course, teachers who adopt new strategies willingly – the early adopters – may be different in other ways from teachers who elect not to use new strategies. However, the research can be useful even if the interviews are with teachers who are not representative of the population because if the early adopters have negative perceptions of the games then there may be problems with either the underlying premise, the design of the games, the method for introducing the games in the schools, or other issues that should be addressed. If the early adopters have positive perceptions of the games, then gradually, other teachers may also begin to use the games.

Another delimitation is the decision to interview teachers only and not to interview the administrators, students, or parents. The rationale for restricting the interviews to teachers only is that the time required to conduct the additional interviews would make the study unfeasible due to cost and time. Furthermore, teachers are the primary gatekeepers for learning experiences in the classroom. The desires of students, parents, and school administrators influence the behavior of teachers; however, teachers design their own lesson plans and execute the lesson plans. If the teachers do not perceive value in using games, it is extremely unlikely that the games will be used with fidelity

even if the school district were to mandate use of the games. If the teachers perceive value, then future research can probe the perceptions of other stakeholders.

One of the most significant limitations over which the researcher had no control is the time constraints on the length of the interviews. Secondary school teachers have demanding schedules and they rarely have time during the school day for thorough interviews. Therefore, the research had to be conducted with maximum possible efficiency and respect for teachers' schedules. Even with this effort, two of the teachers who agreed to be interviewed, did not agree to schedule a time for the interview. The teacher with the shortest interview requested that the time be limited. This pressured the researcher to have shorter interviews than would be ideal.

Another limitation is that fostering moral reasoning in games by challenging students to consider the factors that influence their actions – especially when moral dilemmas arise during the play of an academic game – is a complex skill that has not been adequately addressed in ICPD workshops. Giving teachers the opportunity to engage students in moral reasoning does not mean that teachers are prepared to take full advantage of the opportunity, and Berkowitz (2012) has pointed out that generally teachers are not prepared adequately for developing moral character. Therefore, modest expectations are appropriate in many classrooms.

Additional discussion of issues regarding reliability, validity, and the limitation and difficulties generalizing from the research are presented in Chapter 4 beginning on page 159.

Chapter Summary

The purpose of this chapter was exposition of the intervention and the research method used to answer the research questions presented in Chapter 1. Since the literature review identified no scholarly theory or research that analyzes pedagogy based on games that keep score of cooperative performances between different sides, the present research explores for data by interviewing teachers who have experienced these games in their classrooms. Since the author conducted workshops for nine of the teachers who were interviewed, he has worked with them professionally and has observed their interaction with students during the workshops. Of course, this experience working closely with teachers gave the author insights that go beyond the data generated from the interviews.

The content of the workshops varied based on the subject matter the teacher was teaching, the learning objectives and the behavioral objectives set by the teachers, and the preferences of the teacher for interacting with the facilitator. Each of the teachers interviewed experienced workshops in their classrooms with their students engaged in three essential elements:

1. Playing both concept games and academic-content games;
2. Scorekeeping in which different sides lose together or win together depending on their ability to improve their performance in a series of contests;
3. Learning by gathering data from the scores generated in the games with which the different sides may reflect and collaborate to develop strategies for improving future scores.

One of the design elements of this process is that data produced by the games can be used to assess the performance of individual students when they participate in

cooperative learning activities. This scoring process is accomplished by the all-for-one score sheets in Appendix A.

The research method involved purposeful sampling of secondary-level STEM teachers who participated with a facilitator in at least four ICPD workshops. Using thematic analysis, interview data were distilled into themes. Several limitations to the research method were noted including desirability bias attributable to decades in the development and promulgation of games by the author.

The following chapter summarizes the findings from the data produced by the research process described above.

Chapter 3: Research Results

As explained in Chapter 2, the author used thematic analysis as the research method to analyze interviews that address the research questions: when teachers use games that keep score of cooperative performance, what effects on students' character and academic performance do teachers attribute to the games? What challenges or benefits do teachers see in using games that keep score of cooperative performance?

The results of the analysis of the interviews are organized into themes that are listed below and examined in the remainder of this chapter. As explained in Chapter 2, the process of searching for themes involved both an inductive approach and a deductive approach. The inductive approach discovered themes by reading the transcripts to glean the teacher's ideas. Other themes were derived by an a priori process of searching the transcripts to find answers to the research questions; this deductive process focused on teachers' perceptions regarding students' character education (question 4) and academic achievement (question 5). Therefore, the coding process included search for answers to a priori questions to see different ways teachers addressed the questions.

The themes and sub-themes that developed primarily from the inductive approach are marked with an asterisk (*) in the list below. The themes that developed primarily from the deductive approach are marked with a hashtag (#) in the list below.

After coding, the author compared the codes and their relationship to the research question to identify themes and sub-themes. He also used a computerized spreadsheet to cross index the codes, sort the codes, and compile the codes into themes, sub-themes, and

in some cases, level-two sub-themes. The following is a list of the themes and sub-themes derived from the thematic-analysis process described above:

Table 6 Summary of themes and sub-themes

- Theme 1 Teachers' overall opinion of EnTeam games #
  - Sub-theme Student Engagement *
  - Sub-theme Scoring cooperative performance #
- Theme 2 Character development #
  - Sub-theme Peer-support among students *
    - Level 2 sub-theme Social perspective taking #
    - Level 2 sub-theme Peer-leadership *
  - Sub-theme Empower students by delegating control *
  - Sub-theme Under-emphsis on moral reasoning #
- Theme 3 Academic impact #
  - Sub-theme Feedback #
  - Sub-theme Learning through reflection #
- Theme 4 Teachers services *
  - Sub-theme Teachers enjoyment teaching with games *
  - Sub-theme Future services *
- Theme 5 Administrative support *

* indicates themes and sub-themes generated primarily by the inductive approach

# indicates themes and sub-themes generated primarily by the deductive approach

In the following sections of this chapter, selected quotations for each theme are cited and denoted by the spreadsheet column letter and row number such as (Line B61) where the original transcript can be found without revealing the real identity of the

teacher. The analysis of the interviews is influenced by the observations and insights the author gained while working with nine of the ten teachers with whom the author co-facilitated the workshops. (One of the teachers, Kay, experienced EnTeam games with another facilitator, Tom Evans.)

The first theme is the teachers' overall opinion of EnTeam games which generally was positive, but implementation was not perceived as easy.

Teachers' overall opinion of EnTeam games

At the beginning of each interview, the teachers were given the opportunity to state their overall impressions of the impact of the games. While all teachers had positive things to say about the games, most of them raised concerns and offered recommendations for improvements.

Kay, a high school teacher in a health-science program, described her overall impression of using the games in this way: "It was very positive. I thought it brought a lot of good energy to the classroom and it brought my students closer together while they were learning, so it made learning fun" (Line B14). And, although she spoke favorably about the games, she also said, "I have done a little bit on my own" (Line B34). If the games are going to make a real impact on the culture, it would be desirable for teachers to take sufficient ownership of the process to integrate the pedagogy of this collaborative learning process into lesson plans more than "a little bit." This raises the question why did Kay not use the games more frequently.

Kay was not alone in her disconnect between being favorably impressed with the games and using the games frequently and independently. Of the 10 teachers interviewed, only five self-report that they continued to use the games independently

after experiencing In-Class Professional Development (see fifth column *IGU, Independent Game Use*, in Table *5* on page 89). Furthermore, it is an open question that will require additional research to determine whether those who self-report using the games independently actually use the games with fidelity to the EnTeam process of empowering students to measure cooperative performance, reflect on the data from the scores, develop their own strategies for improving their learning, and test the efficacy of their strategies by repeating the games with new curricular content.

Several teachers indicated an explanation for this disconnect between being favorably impressed with the results that the games produced and incorporating the games into their lesson plans. For example, Ruth, a general science teacher whose student test score results are shown on page 64 in Figure 4, stated that she found the process of using concept games and content games in sequence confusing at first (Line B8):

> I didn't really understand it until I got to work with him [the EnTeam facilitator] for a year, and he -- we had a partnership for a whole year where we did the metaphorical games [concept games] and began doing the academic games [content games] and so I had the opportunity to teach for an entire year using the [EnTeam] academic games and seeing how they really fit into the classroom and increased engagement and how students work together and thought about the problems, and it was really amazing, actually.

The fact that it took an extended time for Ruth to fully understand EnTeam games may be attributed to multiple factors: first, there was no professional-development workbook connecting the EnTeam process to science curriculum (only game rules and a general introduction to the EnTeam concept) at the time Ruth was beginning to use EnTeam

games. Second, she was helping the author adapt the games to the school district's science curriculum. Furthermore, the EnTeam process is not something that teachers have experienced in their own schooling.

Obviously, a year-long professional development program is a major commitment that requires resources and effort that exceeds the typical public-school capacity -- at least according to the administrators of most schools in which the author has served. Undoubtedly, efficiencies could be achieved to shorten the training that Ruth experienced. Another way to accelerate the implementation of the EnTeam process would be to have better explanations of the games; this is discussed further in the section on *teacher services* – see page 142.

Another aspect of the overall impression of the experience with games on which all ten of the teachers agreed is the utility of using games as pedagogical tools. For example, Ed, a healthcare science teacher (and, of the ten teachers, the one the most skeptical about EnTeam as a pedagogy) described using one of the games as a simulation of a future-work scenario in a clinic (Line B61):

> Umm, I think I mentioned this to Ted, that the best learning objectives would would go along with the games -- the ones that were more -- uhh, best ones were where the receptionist -- one student was the receptionist and the other student was the client. Those we do well -- those work well together and and physical exams, since when you do a physical exam on a pet, the vet assistant is on one side and the client is on the other. So those were the those were the two biggest objectives that would fit well with the games themselves. But again I feel like I feel like I felt like the overall grand scheme of things with the games was to try

> to get kids to know how to share ideas and feel more [teacher was interrupted: a group of students made noise in the library and announcements came on the loudspeaker]

Other teachers made similar comments. For more examples, see the discussion of *academic impact* on page 130. This unanimous agreement that games served the educational purposes might be attributable to the fact that the teachers who used EnTeam games volunteered and were interested in increasing their use of cooperative learning. Therefore, further research is needed to test the breadth of teachers' willingness to teach with games.

Student engagement. A sub-theme that all ten of the teachers mentioned is that EnTeam games engage the students in learning and helping each other learn. Teachers gave several reasons for this engagement. For example, Dee, who teaches in a science program at a technical high school, said, "I noticed with the students, they ...were excited to do something different and go about trusting each other in a different way" (Line B14). This trust between students grew, she suggested, from the structure of the games that involved pairing up student who normally don't talk and, as Dee said, "...really look face to face and talk to somebody [teacher laughed] which is, with the technology these days, unusual... so I think it helped with communication skills, it helped bring them closer together" (Line B17). Dee expanded on her point by describing one of the benefits for teachers: "going back to the problem solving and communication, they have to work through it together whereas before they would practice independently on their own and just come to me for the skills test. Now they depend on each other" (Line B109).

Dee attributed her perceptions that students became engaged in helping each other and developed working relationships. Therefore, they began to trust one another because the games gave them opportunities to get to know each other while they were doing their school work together. In response to the question, "Thinking about the character of your students, have you noticed any difference in their engagement or respect or anything else related to character either during the EnTeam games or after playing EnTeam games?" Dee said that there was an initial effect produced by the games (Line B32):

> I would think with the character that they seem to have more awareness of [pause] each other's, umm, I guess you want the character, and what that entails after; it was short-lived after but the initial day after, the few days after that week they seem to be more aware of each other as individuals and the specific things that make up the characters of that person, why they're different, because we have a lot of different personalities, you know students with different home lives and things so some of them are more shy and introverted and some are really extrovert and this seemed to help to bring those together more.

Whether this effect would last longer than a short time if the games were used regularly is unknown and will require additional research. Dee did not report that she continued to use EnTeam games independently.

A math teacher and teacher-coach, Nat, explained the development of engagement and trusting relationships between students somewhat differently: "It's more of the teacher is a facilitator and the kids more lean on each other as peer assistants, peer tutors, peer helpers within the games and activities in the class" (Line B16). The role of the teacher as facilitator and the students as peer assistants is in natural alignment with games

that keep score based on how well students help each other succeed in mastering curricular content. The score reinforces the idea that if we are not winning together, we are losing together -- and we are all losing.

If students want to win, students must be good at helping everyone master the curriculum. For example, Ruth gave evidence of student engagement in terms of students losing track of time because they were focused on helping each other learn (Line B106):

> There were a lot of days that they were 'oh class is over already?' and, so, we had 70-minute classes so to hear 'class is over already?' is really exciting. [teacher laughed] To hear 'oh, we have to go' because they were just so engaged and they're middle schoolers, they got to talk, yet they got their work done; and they were learning something so they had the same like 'wait a minute, I got to do this, I'm learning something, and I got to visit with my friends' so [teacher laughed and did not continue talking after laughing]

When students say that time flies because they are enjoying studying together – simultaneously meeting social needs for interpersonal relationships while gathering feedback on their academic progress – it is not surprising that teachers would perceive that students are engaged.

Scoring cooperative performance. An a priori topic is the teachers' perception of the scoring process and its impacts on issues -- such as the free-rider problem that plagues cooperative learning. Since scoring cooperative performance between players is the unique feature of EnTeam games in contrast to other cooperative learning approaches, teachers' observations about the scoring process are central to the research and was explicitly posed as a question in the interviews.

Ruth explained one of the ways the facilitator (the author) introduced her to the games and the scoring process by playing the games with the teacher and with the students (Line B29):

> So, at first [the facilitator] definitely would lead, he -- he would come in and play [the concept game] with me and we would come up with an idea of what would work and he would come in and then model how to do it with the first hour and then we would co-teach like the second hour and then by the third or fourth time I would be doing it on my own and he would be just kind of observing and interjecting when necessary. So we were co-teaching.

Thus, the scoring process was introduced to the teachers in the context of the preparation and delivery of a demonstration for the students. Therefore, the teachers were expected to absorb multiple elements simultaneously: the scoring process, changes in relationships among the students, and pace of academic achievement. Some of the teachers may have been overwhelmed by this approach.

Al, who was a first-year teacher in high school, was first introduced to EnTeam scoring a few months prior to the interview in February. Al admitted that the scoring process was not familiar and that he had not yet incorporated it into his teaching except with the help of a facilitator: "Well, it was definitely new for me. I had no experience with that -- it's a way of scoring a game. I don't think I've incorporated it into anything that I do, yet" (Line B151). Then, Al elaborated two major points for productive projects and peaceful relationships in classrooms (Line B151.1):

> But, I mean, I think what it does is demonstrate a point when we're working on a group project, it's our collective work that really matters and what not our

> individual contributions are, uhh, not to say that our individual contributions don't matter that causes problems. I think what [the scoring process] does is demonstrate a point: when we're working on a group project it's our collective work that really matters and what not our individual contributions are, -- not to say that our individual contributions don't matter -- but at the end of the day if, you know, if people are not working toward the same goal or not everybody is contributing then, ultimately, usually it's a project that won't be as successful and it will also damage relationships of the people working on the project especially if somebody feels like they feel they have to do everything or feel somebody is not allowing them to contribute. That causes problems.

Al's interpretation of the lessons from the scoring process relates to two aspects of peaceful and productive relationships: (1) collaboration among participants determines success in collective efforts and (2) balance in workloads to avoid the free-rider problem (one student doing most of the work).

If Al is correct, that the scoring process reduces the free rider problem and empowers students to balance the workload and unify collective effort, then one may ask why doesn't he use the scoring process in his work as a teacher. Later in the interview in response to a question about plans for using the games, Al stated he is early in his teaching career and he may yet keep score of cooperative performance in the future: "... I can definitely see a role for the scoring process ...some of the same principles of cooperative learning and the group score" (Line B157).

Whether Al will use the scoring process as a pedagogical tool remains to be seen, but not all the teachers agreed with Al that the scoring process addressed the free-rider

problem. For example, Ron, who was introduced to EnTeam several years ago and also experienced the use of the EnTeam score sheets a few times, assumed that the only way he could grade the students in a group project would be to assign the same grade to all the students who were in the same group. Ron explained his interpretation (Lines B108-109):

> I think when you use the grading principles for the activity during class time then you do give Kids the idea that "okay, I know this, I don't know that, but then like interpreting it into a grade that you want to put in the grade book you know we can adapt that to maybe to a participatory grade versus an actual raw score and also and then did the kids participate, do they pay attention, did they get something out of it and that's the way I guess if you want to put a class -- class grade to it that's how you could look at it so -- [Ron stopped talking]

Ron came back to the same point later (Line B123):

> At the very end, you could possibly do a peer grading and then it would be anonymous but you know even when you try to do a anonymous grading, some kids will I will be their friend a score even though they didn't really help participate much in the process, but those are justly pros and cons the activity.

Ron clearly indicates that he sees no opportunity to use the EnTeam process to address the free-rider problem. His perception that individual scores in cooperative activities are not an option might be due to limited exposure to the scoring process, but Jan shows that exposure to the score sheets is not enough.

Jan, also a physics teacher who was jointly interviewed with Ron, saw demonstrations of the score sheets more often than Ron. Although Jan had the opportunity to see how the score sheets work many times, she did not see that the free-

rider problem is addressed so that individual scores could be identified on the score sheets. Her responses to the interview questions showed that she did not see how she could use the score sheets to prevent the free-rider problem. She said (Line B94-98):

> One thing that I didn't like -- in a group I think they were graded based on the -- Some students say, "I know all these things but the other one pulled the grade down." You know, they are very concerned. I think the grading is done in such a way that that they add up all the grades for each group, ABCD and if one group does not do good, it pulls the whole grade down. And grading was also -- it was not clear[ly] mentioned how you grade that work.

Jan's description of the scoring process shows that it was not clear to her that the score sheet has a bottom row of scores that shows the individual performance of students when they are in collaboration with the other students. The ICPD she experienced failed to convey to her how the EnTeam score sheet enables teachers to give differentiated grading to each individual student on one team.

In other words, Jan and Ron both had essentially the same free-rider objection to the scoring even though Jan saw facilitators demonstrate the use of the score sheets and the full process of measuring cooperative performance multiple times. Notice that Jan said, "Some students say, 'I know all these things but the other one pulled the grade down you know'" (Line B95). Jan did not make any statement regarding the fact that she could use the differentiated scoring to answer the student's objection nor did she offer to suggest to the students that they could learn more by helping each other to both master the content.

These observations about the teachers' thoughts regarding the free-rider problem suggest that some teachers such as Al appreciated the scoring process as a means to overcome one of the primary objections to cooperative learning while other teachers missed the point entirely and – even when they were introduced to the scoring process – did not use the score sheets as intended to quantify the performance of each student individually. This disconnect between the use of the scoring process and the design of the scoring process raises questions about the professional development approaches used to introduce EnTeam games to teachers and the subsequent support for the effective use of the scoring process.

Other teachers also missed the potential uses of the scoring process and made the common mistake of confusing cooperative learning with group work. For example, Dee said (Line B135):

> As far as the cooperative scoring, well I mean, how I score them once they both have to say they complete a urine analysis and do a sediment state, the end result, they know they both get scored based on the end result so they have to go through all those particular steps to get to that result and they have to be able to focus it in on the microscope and tell me what they're looking at, so their score is instead of being one they are scored together as a team and so they depend on each other as a team because they are getting the same score.

Dee's approach misses the point of EnTeam scoring because one student can avoid learning if another student will do the work, and therefore there is no protection against the free-rider problem. If a teacher is using EnTeam scoring as explained in Appendix A, both students have different roles and the performance of each student is

objectively measurable. If either of the students is not doing their assignment, they both know it because the score shows the problem for all to see.

None of the teachers indicated in the interviews that they used the EnTeam scoring process as a means for quantitively assessing individual student performance in a cooperative learning project using the EnTeam score sheets as they were designed.

Character Development

The second theme derived from the deductive approach pertains to character development that teachers associated with or attributed to the games. The EnTeam theory of change (presented in Figure 3 on page 55) asserts that character education is fostered by the scoring system used in EnTeam games. The following quotes from teachers indicate that they saw students give each other peer-support and take the perspective of others when EnTeam games where demonstrated. Only a few of the teachers cited below gave examples of addressing moral issues, and at least one teacher asserted that it is not within a teacher's purview to address moral issues (see below in the theme teacher services page 145).

Peer-support among students. In the interviews of teachers, nine out of the ten teachers interviewed opined that students took greater responsibility for helping each other when lessons were taught with games that keep score on a win-win basis. For example, Lea, a math teacher, described conversations between students asking one another questions such as, "How did we get these two different answers?" (Line B104). Lea gave her observation that students benefited and helped each other find the answers so students were on task (Line B111), but she did not claim the games were a panacea. In

response to the question whether the games eliminated behavior problems, Lea gave an unsurprising answer: "No" (Line B115). In other words, games may be useful in engaging students and reducing disruptive behavior in the classroom, but they are only a process, not a complete package of character development – an obvious and important point.

Rae, an anatomy and physiology teacher, made a point that relates to Lea's concern regarding discipline: while describing one experience, Rae said that students start with assumptions about the relationships that they can expect from one another and whether they should share information with other students (Line B100):

> The games were in folders; [students] would use the folders to hide so no one would see what they're doing, and then when they realized everybody must have the same goal, they put their folders down so the other groups could see how they had accomplished going up to a certain height.

Rae gave students the time and space to discover for themselves that they can change their assumptions about whether to share information and how people can work together; the result was that the students solved some of their own issues and prevented problems. And Rae added that engagement resulted in improvement in students' progress (Line B130):

> If you look at my data board at the beginning, it is stapled up now, compared to now and my students have made, especially from a 40 percent at the beginning of the school year to about Thanksgiving they're up to about 60 and now they're up to 80 percent growth.

Rae is describing improvements in academic achievement as shown by the system used in her school. In the following statement, she explained this rapid improvement in student performance as produced by greater engagement, using games to mix students, and encouraging them to think independently without relying on the teacher to give them answers (Lines B100.1-100.3):

> I had students trade partners and at first I let them have the same partner the same five minutes but when I set it up like in four corners of the room and then they would rotate partners it was better, that was the only thing, so that they would not have the same people -- work with other people and get their ideas, their thoughts, and first thing. I like students to ask why to other students so they're asking "why? why?" so they started asking each other "why?" to other students instead of the teacher; like "Ms. Rae come help" [answer this question] and I'm like "no, work it out!" you know. So that they strategize.

Rae used the games as tools to engage students in helping each other, and she built their performance-character skills in collaboration and helping each other master the subject matter by remaining faithful to the process of empowering students. Future research could examine how many teachers are willing to empower students to think about the scores they earn in the games and independently develop strategies for improving their scores.

Al shared views that included comments about engagement (Line B92.1-4):

> I think we did do some things based on conversations we had with Ted that were focused more on teamwork and understanding different roles and how to support each other to get them to where everybody can work together as a contributor.

> We did that work well one time; we have not done as much group work. We have just started doing a group project again or at the beginning of it. I think that they probably doing better than they were before, but there's still a lot of room for improvement is what I would say in terms of teamwork and teamwork to get them really working effectively

Al's sense of progress on a long road also applies to the capacity of students to see the world from another person's point of view.

Social perspective taking. Teachers frequently mentioned the need for interpersonal skills that develop the capacity to see from another person's point of view in ways that build trust and collaboration. For example, Dee used the word "communication" to include many aspects of social perspective taking (Line B46):

> I feel like they were able to take [pause] a lot of the communication that they were doing in the learning game and use it towards the skills they're working on. They really have to depend on each other, to listen, and to focus in to trust who they're with whether they're restraining an animal or doing a procedure, they're learning how to do blood work right now, so I think it helped them be able to work together with each other and follow directions, so I think it helped in those skills, especially communication. Students are lacking more of that these days [the teacher laughed] being able to communicate and and especially step by step directions and as if they had to teach somebody else. So it's really important that it's that they be able to do that.

Dee was one of several teachers who commented on the need for students to see others face-to-face and talk together without technology insulating them from one another if the

students are going to understand each other more fully. She lauded the benefits of games that do not require the use of electronics such as *Talking Dominoes* (see Appendix A) that measures how well students give each other directions and listen to follow directions. Speaking of students, she said (Line B17.1):

> They seem to notice a lot more, following directions, that they had to listen more closely and instead of doing something where they weren't focusing, they really had to listen to what the person was saying to help them figure out the pattern they were supposed to put the dominoes in or whatever game they were playing at the time.

Dee's attribution to physical and mental games that connects students and helps them see from another person's point of view is comparable to comments by Ruth who emphasized the importance of mutual respect and willingness to admit mistakes as notable qualities of interpersonal relationships and personal growth (B50):

> The idea that they were in charge of their learning really help them build self-confidence and they were really just respectful to each other -- if they made a mistake it was okay, it was a learning process so it fits into the growth mindset.

Ruth makes a powerful connection between mutual respect among students, the willingness of students to be vulnerable enough to admit mistakes, and growth mindset. This suggests that the games may have multiple levels of impact for students.

Nat also saw social-perspective-taking develop in students including introverted students. She responded to the questions, "And thinking about the character development of your students do you perceive any benefit or harm from using EnTeam games and the briefing process? And if so, how would you describe it?" Nat said (Line B127-130):

> I think it's a blessing, and I won't to say it's a curse. I want to say that, for the people who are introverted -- intraverted -- yes -- the people who prefer to work by themselves -- because it means that you have to interact you have to talk. As far as the overall effectiveness of it, I think that it's absolutely a character builder. It promotes confidence. It allows kids to problem-solve to work together to collaborate which I'm always emphasize any kids that you don't live by yourself.

Nat's admonition for students to see the larger context of their interrelationships is related to a comment by Kay regarding students' ability to see problems from another person's point of view (Line B190):

> At first, it was a lot of like "you need to listen better" you know, stuff like that, but then over time they got kind of realize, okay, that you know the same result is happening if I'm working with this person or this person so it must be me, you know.

Kay saw that the repeated use of the EnTeam games with different people -- and reflecting on the scores that they produced with different ones -- led students to recognize where they had room to improve. If scores in EnTeam games can help students see from other's point of view and gain self-awareness as well as develop strategies for social interactions, then the games can be useful.

These gains in social perspective taking relate to other observations by teachers: greater awareness of others enhances opportunities for collaboration such as peer-leadership.

Peer-leadership. Although only a few of the teachers interviewed have had EnTeam facilitator support for combining EnTeam games with peer-leadership, some teachers have initiated opportunities for students to lead each other in academic games. The two pedagogies are naturally complementary because when students feel empowered, many want to be leaders. With the game format – as opposed to a tutoring format where the tutor should be proficient in the subject matter – peer-leaders only need general leadership skills to facilitate games that support the learning process. Therefore, students can lead an academic game even when they are still developing their mastery of the curricular content because the peer-leader can always turn to the textbook or ask the teacher for help if the academic material baffles everyone on the team during the game.

One of the teachers who initiated peer-leadership independently using her intuition and simply following the logic of events is Rae who said, "Once they got one game down pat, my students would lead the class, so I did encourage them to lead the class and to have leadership roles which is a character builder" Line B61). When students become so engaged that they assume responsibility for assisting other students, teachers have freedom to help those who need support.

Some teachers engaged in peer-leadership by design. For example, Ruth worked with the author off and on for a couple of years experimenting with various EnTeam games to engage students doing peer- leadership in Ruth's science classroom and in combination with teachers in other subject areas – especially math and reading. These experiments included students from different classrooms at the eighth-grade level and across grade levels. Ruth described to the interviewer the benefits of students serving as peer-leaders (Cells B94.5-94.8):

> I don't know if he told you about the [leadership] program, but that they [8th grade students] had to take a pre-test and if they passed the pre-test they could go [serve as a teacher-assistant] in another class, with sixth grade, and those kids [the 8th grade leaders] had to do independent study projects [for their 8th grade science work]. And the kids [8th graders who did not pass the pre-test, were] left -- it left about half the class with me -- could do more labs and reinforcement of the concept that they didn't get -- so I had kind of a revolving door in my classroom. But I saw the kids really grow where they needed to grow, and so kids who had the basic content were enriched, and I was able to help kids who didn't have basic content and I was able to give a really firm understanding of basic content [to those left behind] so they are much stronger.

The potential for using games to make life easier for teachers and increase the opportunities for students to lead one another holds promise. One of the most encouraging aspects of this peer- leadership approach is for the students who had the greatest need for help. By allowing students to earn the right to leave the classroom and assist in other classrooms, the teacher has fewer students and therefore can give more time to those who need extra help. Plus, the teachers of the younger students have the benefit of older students who have been prepared to serve as aids to the teachers.

Lea described another aspect of peer- leadership in her response to the question, "Have you seen any evidence of the students taking a lesson from an EnTeam game and generalizing it -- using it for some other area of their life?" Lea replied (Lines B80-83):

> I actually have. From some of the transition students, I don't get to see them often because I don't have 9th graders but I have seen them using some of those skills

> that they've learned with, through the EnTeam activities and games during transition in their classrooms so like if I go and observe another teacher just as a peer observation -- not like an administrator coming in, but just as a peer observation, and seeing some of the kids take those skills and pass them along, so they have not gone through transition because not all of the kids come through the program, but just some of those seeing them taking those skills and utilizing them, you know, in another activity or something that had nothing to do with during transition, but and now using it in an English class and they're actually teaching the other kids so I've seen evidence that what they've learned in their participating they have taken ownership and used on their own.

This raises another aspect of using games: teachers need to be willing to give students voice and empower them to make choices independently. This process pushes some teachers outside their comfort zone.

Empowerment of students by delegating control. One of the forms of support that is inherent in games and that impels students on the journey toward greater collaboration in the classroom is student empowerment, but teachers find this especially challenging for several reasons.

Nat, the math teacher and coach at an inner-city high school, described how games empower students (Cells B151-169):

> They are used to the teacher being more the superior in the classroom. Kids learn, the teacher talks. Students write. And this structure turned around their whole mindset as far as they are now the bosses of the classroom and the teacher is more of a facilitator -- their assistant. I would often say you are the CEO of the

> classroom -- you run it. And we think of these EnTeam activities as projects as business projects that you have to get done with a deadline, and so you have to work together collaboratively to be able to to solve the problem whatever the problem it is. And then I would relate it back to real life lives and careers and how this relates. And so as it settles you get out of your comfort zone is always unsettling, but after a while, and you're consistent with it, the kids pretty much got used to it, and it is amazing how they ran the class seriously. And I was more of a pencil and paper person: I went around and they would ask for clarification of instruction. It was so profound to see them function as independent little adults.

Nat's empowerment of the students and her willingness to give up control is significant, and Nat admitted that the transfer of control took effort. She said "Yes, it was a different way of teaching that I was -- it was not traditional -- not my way of teaching" (Line B53). The fact that Nat continued using games as a teacher and now as math coach and is encouraging other teachers to use the games in the classroom suggests that she perceives value in the process. On the other hand, this recognition that teachers often struggle with the relinquishment of control was repeated by other teachers because, as Nat said, it is not familiar.

In addition to feeling threatened by lack of familiarity, there is another obstacle to empowering students and giving them opportunities to learn through games: teachers can feel at risk of criticism from administrative pressure for traditional teacher-centered classrooms. For example, Jan pointed out that she was concerned that cooperative learning is messy because students are moving around, talking, laughing, sometimes off-topic, and therefore the teacher using games can be open to criticism. She said, "I really –

I thought of using it, but it's going to be a lot of movement in the class -- they walk around" (Line B80). And she laughed at the thought, "when somebody comes to observe the class, they may think kids are walking around everywhere, right? [teacher laughed]" (Line B81). Until administrators are consistent in their tolerance for students having authority to participate in the construction of understanding of curricular content, teachers will not have all the support they need to use games as pedagogical tools that empower students to work together to construct meaning in the classroom.

Jan's colleague, Ron, another physics teacher, also was reluctant to use EnTeam games to empower students. Ron also attributed his reluctance to use the games independently to the free-rider problem -- some students doing a disproportionate share of the class work (Line B216-219):

> As I said before, you've got your handful of kids who are really involved ones, but then you've got the others are just tag alongs and they're getting the same grade out of it as kids that are working hard, and unless we do a lot of monitoring and taking notes or such, or we do an anonymous grading system for your kids in your group, that would be the only way to really observe who is doing what so we'd love to do more cooperative learning that would be ideal but again the numbers in the class that's an issue and just buy-in.

Both the fear of the administrative pressure to have quiet classrooms and the fear of the free-rider problem impact teachers' willingness to empower students with cooperative learning games.

Under-emphasis on moral reasoning. As noted in Chapter 1, Berkowitz (2012) has pointed out that teacher education has often failed to prepare teachers in the skills

needed for developing moral reasoning. Therefore, it is not surprising that, in the interviews, teachers admitted that they have not nurtured moral reasoning with their students as fully as might be desirable. For example, Al said Line B98):

> We have not really discussed cheating with EnTeam or otherwise and especially with any sort of creative enterprise or pursuit I think what cheating is is somewhat subjective obviously there's a difference between cheating by looking over a classmate's shoulder and copying over their answers. That's sort of like we're having a piece of paper with the answers written on it. Most of what we do [teacher laughed] -- that's part of it that makes cheating harder to do because not as obvious what cheating is in this environment.

Later, he added another comment about ethics (Line B102):

> I mean, we have talked about ethics a little bit, but I think, uhh, and this sort of comes back to the win-win kind of mentality a little bit and so I think that we tried to maintain that, but I know that my students are still very competitive, and some of them are still focused on their own individual performance rather than the group performance.

Later in the interview, Al described his students' growing awareness of the complexity of human relationships and possibly a step toward what may be a moral question: is it immoral to believe that someone must suffer defeat for another person to achieve their goal? Al described the moral issue regarding competitive relationships this way: "At least they're aware that there are other ways to think about competition – the issues as a result of these scenarios that they hadn't probably even considered before" (Line B108). Al's statement might imply that experiential learning can open thought to deep understanding

of interrelationships and values while studying curricular content. His observation raises the possibility that students will dig deeper into the complexities of moral issues because they have been challenged more often and give more opportunities to reflect than classroom instruction has traditionally provided.

The fact that Al is open to exploring moral issues with his high school juniors and seniors is encouraging. On the other hand, Ed offered an alternative view: that high school students are too old to address moral reasoning about interpersonal relationships and that it is not the teacher's responsibility.

In response to the interviewer's question, "I'd like to know -- what did you observe as a result of the EnTeam game?" Ed took a strong position regarding the malleability of student thinking about collaboration among diverse students (Line B206):

> Umm -- Well, again, again at this age they -- and when he [the facilitator] came into the classroom, they probably -- like they've already got the people they work the best with. And there's also that dynamic that -- at this at this age that they they just have it set in their mind who are you, who do I think I can work with, and who am I just not going to try to work with. So [teacher stopped talking]

If the development of moral reasoning requires that students progress in their willingness to wrestle with their beliefs and values, teachers who assume that a students' mindset become rigid as teenagers may not ask questions that could nurture moral reasoning. As a follow up to Ed's description of the lack of plasticity in students, the interviewer asked, "Do you ever attempt to break that [fixed mindset] down?" And Ed's response was emphatic: "No. I don't have time to do that! Absolutely not! No. That's WAY beyond my, my [pause]" (Line B216-217), and later he added, "I feel like that's how real life is and

that's what these kids have already learned at the age that we're working with" (Line B230).

The assumption that students lose their capacity to increase in terms of moral reasoning regarding interrelationships may have implications for the use of EnTeam games, but further research will be needed to understand those implications. Earlier in the interview, Ed explained his view about social development of his students (Line B51):

> I try if they have, if they have if they have a minor disagreement, then they usually work it out on their own; I let them work that out on their own. There have been times where I've had them come up to me and say you know I just cannot work with this person, can you switch me to work with another person: But overall they, they -- I think I think that at this age they've already got the concept of of working together. You know I feel maybe that the games were more for younger audience and would be best served with introducing -- I can see a lot of value in with introducing it to kids just how to approach another student, uhh you know, how to get along with them and what things to say, you know, if you don't agree with them and how to go down that road but [teacher stopped talking]

This view that high school students are fixed in their capacity to develop higher levels of moral reasoning is not shared by Kay. In response to the interviewer's question, "In any of the games or processing of the games, in the debriefing, has the idea of cheating or ethics come up?" Kay responded (Cells B60-70):

> Kay: Oh yeah, absolutely. We always talk about, you know, how it's not going to help you cheating, you know, so you might get that instant gratification you could call it, but in the long run it's not going to help you, so yeah.

> Interviewer: and you feel like the discussion has been richer because of the games or was it just a typical discussion about cheating?
>
> Kay: no, I mean it was it was a more light-hearted way so it's not like after we took a test and somebody cheated and I have to come down on them about cheating. It's not okay, blah blah blah blah. It was in a more light-hearted way, so I think that was more beneficial.

Kay is courageous enough to address the ethical issue of cheating, and in response to a follow up question regarding whether cooperative scoring had any effect on the conversation Kay had with her student about cheating, Kay's answer was not vigorous. She said (Line B78)

> On the cheating part? That I'm not too sure, but I know that we talked about, you know, it's not going to do you any good, you know, to cheat on the scores so but as far as bringing that into the cheating conversation I'm not sure how much I use that.

How much Kay used the games to engage the students in reflecting on their reasoning process and the moral implications of the means students use to improve the scores is not clear, but notice that she pointed out that "it's not going to do you any good to cheat on the scores" (Line B78). This recognition that the scoring process is cumulative – each game sets the bar that defines success or failure in the subsequent game – leads players to see that cheating in one game makes it harder to win in the following game. This type of experience could be used to engage students in a metacognitive approach to their choices. The fact that real improvement in performance is required, otherwise the EnTeam scores becomes meaningless, the game degenerates into a farce, and the players are exposed.

Kay also referred to a significant situation that pertains to moral-character development through games (Line B54):

> Last year I had a very challenging group. There was a lot of tension between the girls; there were eight girls. EnTeam definitely helped kind of get over that and make it more comfortable and a better environment for them for sure, so I definitely noticed a big difference when I used them with that group. They were able to get a little bit closer and there wasn't as much, I guess you'd say, bullying going on after using EnTeam.

Kay is referring to a sequence of events without giving the details. Those details were central to the work of the EnTeam facilitator who served in Kay's classroom providing In-Class Professional Development. In the next chapter on page are further details regarding this specific situation and the development of moral reasoning that enabled the students to resolve conflict and prevent the expulsion from school of two students.

Teachers' impressions that games can strengthen character development and moral reasoning would be significant even if the games did not have an impact on academic achievement. Fortunately, the evidence that the games increase productivity in academic endeavors is also promising.

Academic Impact

Given the pressure on schools to raise academic achievement for all students – and especially those from families with low incomes and minority families – the question

whether the games raise academic achievement may determine whether educators accept the games as a regular part of their pedagogy.

Nine of the ten teachers interviewed attributed positive academic behaviors to the games, however only three – Rae, Ruth, and Jan – provided any evidence to support the claim.

Rae, who teaches anatomy and physiology to nursing students, described the academic impact of the games in her classes. She said that the number of students able to pass the standardized test increased after she started using EnTeam games. Rae described the way she used games to build vocabulary by weaving games into other methods of teaching (Line B151):

> I start off teaching using the [EnTeam game] graphic organizer, and then I would show the video, and I would go back to the graphic organizer, and show the video, and then play an EnTeam game so they can all bring it together.

She attributed academic success to repetition that naturally occurs in games and said that previously vocabulary had been the single largest obstacle to students passing the exam and she supports her assertion by referring to the student assessment process used in Rae's school on the "data board" (Line B130):

> The students who -- there's a lot of students who have not been able to pass the anatomy test, but the students they usually -- the students that don't usually pass are ones who can't get get it visually in their mind and it gave them more visual and I did see like a 10 - 15 percent growth, if you look at my data board at the beginning, it is stapled up now, compared to now and my students have made,

> especially from a 40% at the beginning of the school year to about Thanksgiving they're up to about 60 and now they're up to 80 percent growth.

The game that Rae is describing is a slightly modified version of a vocabulary exercise commonly known as the Frayer model. In the standard form of the Frayer model, students work individually. The EnTeam modification simply challenges students to measure how well they can master the vocabulary collaboratively. In the EnTeam game, the students score points based on the number of examples of correct use of a word that student A writes after student B thinks up examples. The students win or lose together depending on whether they can increase their scores continuously in multiple rounds and with multiple different partners.

Rae elaborated on how the game process engaged students in academic content (Line B185):

> There was this game, I can't remember what lipid system we were on, but but they had to create a connection, the goal was to go from one end of the room to the other end and they can't, they had to stay attached to each other so the students, all my classes did it, and they all accomplish the goal but one because they realize the closer they got and they had to call a vocabulary word, so you know I I think I enhanced because I'm big on vocabulary and applying it, so I had them to work five minutes in each group to gain through vocabulary words, and they had to decide how to do a real life situation to apply the disease that affected the body and what organs. was important and they were able to work with the vocabulary words so when they realized they're using them too much just asking them what they know. They know but this helps them apply what

> they know. They say "I didn't know I knew it" and I said "yeah!" It just helps them without sitting and getting, not waiting on the teacher they just get up and get.

Notice that she described how the students realized their growing understanding of their own learning and the game "...helps them apply what they know. They say, 'I didn't know I knew it' and I said 'yeah!' It just helps them without sitting and getting, not waiting on the teacher…" (Line B185). Rae interpreted students' actions: "Some students wanted to help more, wanting to help and to take ownership and to try to get up to the goal that we set at the beginning of the game. So I saw students do that a lot." (Line B80). This interpretation of students' motivation to help other students may apply to Jan's experience in games designed to build vocabulary.

Jan described a simple action-research approach to gathering data on academic impact of the games (Line B305-307):

> One time before I gave a test on vocabulary -- that helped because Ted asked me to compare it with the previous different concepts, but still after playing this game, most of the students, they understood the vocabulary; they got it, so I think that there is improvement by playing these games because I said before the game this help, but like I said, we did not do it that many times to have consistent results.

If teachers repeated this type of experiment comparing results with and without games often, then the results could be trusted, but a single experiment is only an anecdote.

A more extensive experiment of academic achievement was cited on page 62 in the bar chart in Figure 4 which compares two years of state-test scores from students

taught by Ruth without using EnTeam games with test scores from two years in which Ruth taught with EnTeam games. The students taught with EnTeam games had higher test scores than those not taught with EnTeam games, but again, more research will be needed before drawing conclusions with confidence.

Nat, a math teacher and coach for other teachers, described the range of uses for the academic game and the outcomes in response to the question, "Okay, and thinking about the academic work of your students when you used EnTeam games how would you describe the effect of the games on their academic progress?" (Cells B260-270):

> So but after -- we kind of got into the swing of it we found that it could help them be better thinkers and I say better thinkers so it applied academically so when they -- like I say -- we used it for quizzes or other kinds of assessments, formative assessments or summative assessment, the kids would do better because they would remember the activities and they would remember the questioning. They would remember the falls and and say "oh no I remember such and such and so and so" and then don't do it like that so I saw them thinking better when we use the games And it applied to higher scores on the assessment.

But this academic success did not occur quickly. For example, Nat said that achieving academic impact, "...was a struggle at first, the first two times it was not [successful] to be honest" (Line B 147-148). The fact that Nat persisted with academic games and used the games both independently and with the author, and then, when she was hired by another school district as math coach, welcomed EnTeam games into her new school, suggests her opinion that the games increased learning.

Some of the teachers did not make the connection that the games could provide a context for engaging students in academic lessons. For example, Ed admitted that the relationship was not apparent (Line B14):

> The experience was positive. He [the facilitator] was very clear in the instructions and introducing the game. But as far as relating it to umm [the curriculum] -- I was still just trying to figure out where the connection was between the game itself and how it related to the curriculum. That was really just you know -- but overall the students reacted well to it.

This disconnect between the ideal application of EnTeam games as depicted in *Figure 5* and 6 (starting on page 74) and the communication with the teachers points to a need for better professional development for teachers.

Feedback. Although feedback was not a specific question in the interviews, four of the ten teachers referred to the scores as providing feedback. Therefore, a sub-theme of academic impact is the students' and/or teachers' use of data that they glean from academic games. Because the research and theory of feedback drove the author to look for teachers' perceptions of feedback, it is classified as a deductive sub-theme.

As explained in Chapter 1, research shows that feedback is a powerful support for learning and mastering a subject, but only if the feedback informs the students how they are doing and how they can improve their performance. Feedback that gives abstract praise is negatively correlated with academic achievement (Hattie & Timperley, 2007). Since game scores provide feedback on the performance of the students in mastering the curricular content, game scores should benefit learning.

Ruth, who collaborated with the author in developing games aligned with the eighth-grade science curriculum and worked to gather data on the impact of the games on test scores, described her perception of using games and the feedback students get from the scoring process of the games (Line B100):

> Yeah so, we would do games and projects -- I mean it was a plethora of things that kind of came together with this big -- gosh -- definitely it, it was a really nice way to show academic growth, and with the games it was quick feedback for the kids to see their level of understanding, like, they like that level of instantaneous 'we got it, we're growing, we're getting better, oh we made it' so you know [teacher laughed].

The fact that the feedback came to the students from the scores in the games rather than from the words of the teachers may empower students to experiment with approaches to learning and to reflect on the results that they obtain from the different approaches to their goals.

Kay gave a significant example of how feedback from the game scores benefits students who are preparing for careers in health (Line B182):

> Teacher: um I would say the dominoes game is probably the best. We are health care so it's really important to talk to people and be able to talk to people and I think it's kind of shocking for the kids when they play that game for them to realize they think they're giving clear instructions to the other player but when they look at you know what the other one has built is completely off, they have to reevaluate themselves like "maybe I didn't clarify this or" which you know is

> really important to do when you're talking to a patient, for example to be specific and clarify what you're saying so the message doesn't get misconstrued

Here a teacher sees students use feedback from the games to generalize about life outside the classroom.

Ron interpreted the scores as information the students can use independently of the teacher; he said "…and so it's kind of a self-test" (Line B55). His full statement was as follows (Lines B54-58)

> Especially, especially it's a good way to reinforce the material that you have been covering and then you are doing, then you're doing it in a fashion of cooperative learning amongst their peers, and so it's kind of a self-test and -- and like Ms Jan said, if we can get the students to buy in and be involved then it's basically just reinforcing their own successes, and again it's just -- you're going to have your couple of students are not involved and want to drift off, but you know hopefully, you steer right back in the right direction and everything works out well, so.

To the extent that students use the scores as a self-assessment of progress and make independent adjustments to their academic work, the students become empowered to be independent learners.

While doing workshops, the author heard teachers describe how feedback is beneficial to teachers as well as students. Data from the games gives teachers information that can lead to adjusting instruction, planning lessons, and revising the plans as they gathered the data. For example, Lea described teaching math lessons on financial calculations and then using a game in which students solve interest-rate problems. She

responded to the question, "In terms of the academic impact on your students, do you see any results from their use of EnTeam games on their academic achievement?" as follows (Lines B90-97)

> You can kind of, it really depends on what you're actually doing, you know we were doing an activity with personal finance and the savings rates and some of the kids in one of the activities when they gave their partner a -- an amount that they put in in a month and a savings rate and all of that, they actually had to figure out about how much they were saving after a certain amount of years some of the kids. We've been going over it -- I've been going over it for the -- As a teacher, you don't know this? you don't know this? we've gone over it. You see some of the kids actually trying to work it out. They say, "you have to do it this way" so you see some academic progress there. And you also see, oh, wait a minute I need to go back [teacher laughed] there's too many of them who do not know how to get it, so. [Teacher stopped talking]

Notice the feedback for Lea: "Oh, wait a minute. I need to go back…too many of them do not know how to [solve the problems]" (Line B97). Lea's observation was facilitated by the fact that the students were working independently in small groups, and therefore, she was free to observe them playing with the problems and scoring their own performances. Furthermore, she did not have to grade their work because the game scores gave students (and the teacher) immediate feedback on student performance.

Learning through reflection. As pointed out in the literature review, reflection is deemed the heart of learning according to the philosophy of experiential education. The

author's experience from working with these interviewed teachers (and other teachers in many schools) leads him to the opinion that students would benefit from a more structured approach to reflection. Rae is one of the teachers who was explicit about following the EnTeam procedures for structuring time for reflection. Rae called time for debriefing and reflection on "the pros and cons," and she described it as follows (Line B71):

> The debriefing was after they won the games, we do the pros and cons, 'this work well, next time, we should do this better' and the students got very good. When after two or three times -- basically two times -- I have juniors and seniors, they take over their game and they love the debriefing because you know that's there, well "this was positive but you know" they like the debriefing part, what they could have done well what they could have done better.

Rae's consistent use of debriefing and reflection time may have contributed to her data that showed an increase in the number of students who passed the nursing exam, but more research will be required to verify that interpretation.

Al made explicit reference to reflecting above and beyond the debriefing time built into the games. He said, "We talked about it and reflected at times, at times when Ted hasn't been with us, you know, to -- talk about how we work together on projects and what's working and what's not working" (Line 53). The message behind the answers from Al and Rae may be that students become increasingly comfortable discussing the work that is challenging when they feel safe about revealing weaknesses and asking for support from one another.

Further research will be needed to determine how effective the games are in promoting reflection. And while Al and Rae mentioned that they valued the reflection process, none of the other teachers explicitly stated that they perceived the benefits of reflection. This raises questions about whether the use of reflection is as thorough as would be optimal.

Teacher Services

None of the interview questions asked teachers about ways that EnTeam games serve teachers now or could serve teachers in the future, but comments by the teachers pertained to both current and future benefits of EnTeam games.

Teachers enjoy teaching with games. One of the current benefits pertains to whether teachers enjoyed teaching when using EnTeam games as a teaching method. Without being asked, eight of the ten teachers volunteered that they like this pedagogy. Ruth said, "I really enjoyed it. I was less stressed and teaching was more fun" (Line B156). One of the possible explanations for the reductions in stress identified by teachers is that students are more engaged than usual when curriculum is taught using games that challenge students to help each other, and therefore the work of teaching required less effort to keep the class on task and engaged. For example, Al stated that before using EnTeam games, "...if [students] didn't see or understand how they could contribute to the team before, they would just disengage and they would just be working on something else" (B120). In a STEM classroom rich with equipment and technology, it is easy for the students to drift into a side activity and disconnect from the lesson and therefore make teaching difficult.

A specific form of student engagement that makes work less burdensome for teachers is peer-assistance. For example, Rae said, (Line B66):

> They had to work together, you needed everyone, everyone needed everyone to accomplish the goal. You can't like, "Well, I'll see" and they can't take out their phones or their electronics to figure things out. They're actually using their brain, that's what I say, and using their thinking, their analytical skills, using DOK 3 and 4 [Depth Of Knowledge higher order thinking skills] and actually accomplish things.

Reading these words on the page does not adequately convey the feelings of the teacher. When the author worked with Rae and saw her animation using the games with her students, he could see the joy she derived from the process. Witnessing the experience in the classroom encourages him to persist.

Enthusiasm for using EnTeam games was strongest among teachers who used the games independently. The teachers who used the games only when an EnTeam facilitator assisted them did not speak about teaching being less stressful, but they did describe factors that cause them stress such as large class size, time limitations, and lack of administrative support. Some of them appreciated having extra support in the classroom. For example, Jan said, "at least when Ted came -- at least we have three teachers in the room; Ms. Liz and myself and one teacher to interact with all these [students] is the hard part in this [work]" (Line B47). In-Class Professional Development is not effective if teachers see having a facilitator working in the classroom as a temporary way to get control of disengaged students.

Future services. As shown in Table *5* on page 89, five teachers self-report that they have continued to use EnTeam games since their ICPD workshops and five self-report that they have not used the EnTeam games without the assistance of an EnTeam facilitator. In the answers to the question about future use of EnTeam games, both groups of teachers report they want more support.

For example, Ron and Jan, both non-users, responded to the question: "What would it take to motivate you to use EnTeam games regularly in the classroom?" with similar answers. Jan said, "We would need some help with that, right?" (Line B160) and Ron said, "Assistance would be the biggest thing, but you know even if -- if there's a published guidebook maybe to reinforce the rules" (Line B162) and later he added, "once we get to the point where we're comfortable with the [EnTeam] process is too, we can create our own and just use the framework of the games." (Line B191). It appears that Ron is asking for the facilitator to do less and the teacher to have freedom to do more with the games independently.

Kay, a user, said "I would hope to keep incorporating because like I said I've had success with it so I would like to continue with that" (Line B166) but later she added that she wants additional support. She said, "ideas and suggestions of different games would always be helpful because then I could figure out how to incorporate them into what I am teaching, you know, in my curriculum" (Line B206). This desire for additional ideas and ways to use the games to achieve the goals aligns with the non-users. For example, Dee, a non-user, said (Line B125):

> I would like to still take and use, we take and found different games that help. We have been using Cahoots; we started using after using EnTeam games so we

> have added in some different games because of how they responded, so we have been using Jeopardy, Cahoots games and different kinds of things because it tends to, depending upon the day and the students, depending on whether they're having a good day bad day or something is going on at home sometimes conflicts between students in the class, different things going on, it tends to help them focus on things they're supposed to be learning as opposed to what's going on to play a game.

Dee like other non-users, would like the resources and support needed to use games in the future.

Rae, a user, said that she plans to continue to use EnTeam in the way that she uses it now, "Teacher: my intention is to use it as an introduction for vocabulary words; it's very good for vocabulary words because there are so many new words, introducing new words in anatomy and biology giving introductory words" (Line B). Rae also added her broader vision (Line B175):

> I would like more teachers to use it and even like companies using it for, because blue-collar world or the real world, it's hard to get people to come together to work together to accomplish a goal. And I would like to see that done, and I would like to be a facilitator to do that.

Rae's view raises the question about means for expanding awareness of the process of using games that keep score of cooperative performances. The current research is based on a laborious process of workshops in classrooms. Whether the EnTeam professional development process of In-Class Professional Development is a desirable and sustainable approach is an open question.

Raising academic achievement and developing character by introducing educational games to teachers has not been an easy or quick process with teachers, and ICPD has not accomplished its purpose with some of the teachers. For example, Ed said he did not see how to use EnTeam games in the future although he uses win-lose games (Line B251):

> I would [use EnTeam games in the future] if I had more examples and if I had a better grasp of how to – of how to – of how they fit my curriculum and how they benefited my curriculum and how that I could use them on a continuing basis such as what I do with the Smartboard or the SMART Notebook files and the Cahoots game. The Cahoots they love.

Later Ed added, "It would be -- it would need to be something that I could use continuously, repetitively" (Line B261).

Ed's message – that he is willing to use games but needs more support materials before he can use EnTeam games – is consistent with the message that other teachers voiced. They do not have time to invent all the materials they need independently. For example, Ron, another of several teachers who asked for more complete and comprehensive explanations for the scoring system and the process for scoring individual student performance in cooperative-learning activities, said (Line B368-369).

> At this stage of the game we're coming to the end of the 3rd quarter, and so you know as far as my position goes, I'm involved with all the senior activities graduation coming up so a lot of my time is going to be, you know, dictated towards those events and all, but I mean if it was possible to get your guide that

> you're referring to by the end of the year over the summer sometime give us an opportunity to go over it we can start from day one.

Clear, simple explanations of the games and the steps for applying them to diverse curricular content is a challenge.

Besides the written materials, coaching and support are also essential. Rae described the way EnTeam professional development started for her when she asked the EnTeam facilitator for better ways to teach students vocabulary required for the nursing examination. "He [the EnTeam facilitator] asked me what do you want to see, and I said my biggest problem is, my students have with vocabulary, and we went on from there" (Line B202). The facilitator showed Rae how to adapt a generic EnTeam game that scores how well the students do at helping each other diagram and identify terms so she could apply the game to anatomy and physiology. And as noted above, Rae told the interviewer that more students were passing the licensing test than in previous years.

Another challenge for professional development comes from the attitudes, assumptions, and beliefs that teachers hold that impede collaboration among students. One example of an assumption that the author perceives as harmful to the use of EnTeam games was cited above and is repeated here because it is also relevant: Ed asserted that: "…at this age [16 – 18 years old students] …just have it set in their mind who they are, who do I think I can work with, and who am I just not going to try to work with. So…" (Line B206). And he later emphasized that it is better to work with younger students, "Probably younger than high school. Yeah that would be the best group to work with because at that time they're still -- they're still learning those social skills for the most part" (Line B241).

The assumption that attitudes toward other people are rigid and unmalleable for older teenagers or the assumption that character education is not the teacher's responsibility – either of those assumptions conflicts with Kohlberg and Hersh as cited in Chapter 1, "Given that people have the psychological capacity to progress to higher (and therefore more adequate) stages of moral reasoning, the aim of education ought to be the personal development of students toward more complex ways of reasoning" (1977, p.55). Ed's assumption also undermines the concept model on which EnTeam games are built. The premise behind EnTeam professional development is that games can serve people of all ages and backgrounds by providing a context in which they can learn to win together in the sense that they can continuously grow in their understanding, willingness, and ability to achieve goals together.

The question for the future of professional development with EnTeam games is how to serve teachers who do not accept the premise that students can grow and improve in their skills and interactions with other people. One approach is to promote the games that assisted Kay in overcoming bullying cited above and elaborated in the following chapter.

Administrative support

Effective leadership in the school and the school district enhances the possibility for the success of any innovation. Although none of the questions pertained to school administration, nine of the ten teachers alluded to administrative issues or topics. For example, in his response to the question, What training in cooperative learning have you had? Ron said (Line B216):

> The district and all really want us to go -- for us to speak less and allow the kids to be more investigative in and do their thing but but as I said before, you've got your handful of kids who are really involved ones, but then you've got the others are just tag-a-longs and they're getting the same grade out of it as a kids that are working hard, and unless we do a lot of monitoring and taking notes or such or we do an anonymous grading system for your kids in your group, that would be the only way to really observe who is doing what so we'd love to do more cooperative learning that would be ideal but again the numbers in the class that's an issue and just buy-in.

And later he added a generalization including his fellow physics teacher, Jan (Line B296):

> You know, she and I we don't have any [state-tested End of Course] classes where we have a specific schedule to follow and we have to be at a certain point so, on any given day, we could put in to, "Okay, we're going to play games today" and so -- flexibility is key and so you know we, we as far as implementing it, we would love to be able to do more [EnTeam games], if possible.

Notice that Ron said flexibility is the key. If administrators script what teachers should say and mandate pacing guides that drive teachers to cover large quantities of curricular content rapidly, there is little room for cooperative learning or reflection on data that students gather from scored games.

A related challenge is the complexity and variety of the work load administrators ask teachers to fulfill. For example, in response to interview-question three about frequency of use, Lea said (Line B39-40):

> Unfortunately for me it's been a busy year so I'm almost like not in my classroom so yeah because I'm the lead for our department and then senior sponsor and some other things so I'm always being pulled left and right so I'm always being pulled left and right. I won't, I haven't used it as much, you know, as I would prefer but, uh, I've had done it a nice amount of times -- to count, I'm not sure.

One question to explore in future research is whether teachers who are given multiple assignments can become more effective as classroom instructors and as character educators by preparing students to take on more responsibilities and engaging older students in facilitating academic games with younger students. As mentioned above on page 121, Ruth had good results giving students who had mastered a topic the option of serving other teachers. This process not only gives students opportunities to serve, it also gives teachers more opportunities to focus on the students who need the most help.

Adopting any new pedagogy is made more difficult if teachers do not have administrators' support in the building and in the district. Ruth had vigorous support from her building principal because he recommended that Ruth engage in a long-term EnTeam program. When administrators are supportive, the games have a chance to be useful; when administrators are not supportive, the use of games is futile or at best challenging.

The challenge of using educational games is compounded when administrators at the district level and building level are not in sync. As noted above in the section on

student empowerment, Jan said she was reluctant to use EnTeam games unless a facilitator was in the room because, "when somebody comes to observe the class, they may think kids are walking around everywhere, right? [teacher laughed]" (Line B81). Expecting teachers to innovate and use cooperative learning is futile unless teachers feel supported in giving students opportunities to become fully engaged and active in learning.

Chapter Summary

Braun and Clarke (2006) challenge researchers to use data to tell a story. The story told by the data derived from workshops held in classrooms involves three types of participants: teachers, students, and EnTeam facilitators. The teachers' opinions of the effect on students -- when students participate in games in their classrooms -- provide the core of data. As a workshop facilitator, the author gained insights into the context in which the data was formed and saw the teachers' experiences in the context of the workshops.

The two central themes of the story are derived directly from the research questions about impressions of character development and academic achievement. The teachers described the games as engaging students by connecting the students in working together and gaining skills necessary to be more successful academically and more respectful of one another. Teachers described students as becoming effective peer leaders. According to the teachers, the games empower students to make decisions and allow the students to develop strategies for mastering the curricular content and test the efficacy of different strategies for learning. The outcome is improved academic

achievement according to a few of the teachers, but more research is needed to verify these impressions.

One of the highlights of the story is that students lose track of time because they are absorbed in academic games and become surprised that class has ended. Another highlight is in the enjoyment that teachers gain from teaching with the games and ask for better support materials so they can use the games independently.

The following chapter examines the findings, relates the findings to the research reviewed in Chapter 1, evaluates the trustworthiness of the findings, and proposes potential actions that may be warranted based on the findings.

Chapter 4: Discussion

As explained at the opening of Chapter 1, the purpose of this study is to learn whether educators perceive that teaching academic subjects with games that keep score of students' cooperative performances facilitates character development and boosts academic achievement. To achieve this purpose, Chapter 2 presented a method for conducting qualitative research by interviewing ten teachers who had experience with measuring cooperative performances in their classrooms using the EnTeam approach for encouraging win-win relationships among secondary-school students in STEM subjects.

Chapter 3 analyzed interviews of ten teachers who participated in EnTeam workshops facilitated by the author and other EnTeam facilitators using EnTeam games in their classrooms. The purpose of the interviews was to answer two research questions posed in Chapter 1:

- When teachers use games that keep score of cooperative performance, what effects on students' character and academic performance do teachers attribute to the games?
- What challenges or benefits do teachers see in using games that keep score of cooperative performance?

This final chapter discusses the findings from the research, examines limitations to the research, and suggests future research that could lead to more extensive evidence and more effective methods for rebalancing the systems of character education through sports by adding games and scoreboards that keep score of cooperative performance.

Discussion of Findings

From this study, the findings that stand out to the author include the following.

Findings regarding the novelty the data. The data used in this study were generated by teachers watching something that they had not seen before: students measuring on score sheets how well they worked together to perform tasks and developing their own strategies to improve their performance doing those tasks. The introductory tasks, concept games, were designed to cultivate thinking skills but involved no academic content. Teachers observed their students – and sometimes participated with their students – in novel activities: physical games that challenge players to win together or lose together depending on whether they can improve their performance in a series of collaborative activities. After the students played a series of concept games and experienced the process of measuring cooperative performance, the teachers saw them play academic-content games, to master the learning objectives that the teachers set for their classes. Teachers were asked about their perceptions of the effects they saw on their students during the games and after the games. Five of the ten teachers reported that they continued to use the games with their students after the demonstrations.

None of the teachers interviewed for this study, and few of the hundreds of other teachers or scholars that the author has queried about the measurement of cooperative performances, were familiar with games that keep score of cooperative performances between different sides. The novelty of this data is supported by the literature review in Chapter 1 which concluded with the statement that scholarly literature on games that keep score of collaboration between teams appears to be scanty and the practice of

measuring cooperative performances on scoreboards that students can objectively self-assess their progress appears to be negligible.

Although the author has for years been asking scholars, educators, coaches, and youth-program leaders, he has found very few who are exploring alternative scoring systems and none who are measuring cooperative performance in classrooms with games children can play independently as they can with EnTeam games. Hours with search engines and the assistance of research librarians has yielded no one studying scoring systems that keep score of cooperative performances. He has asked scholars who specialize in sports and games for the names of other researchers who study in this area. So far, this effort has identified no research comparing win-win scoring systems with win-lose scoring systems.

If neither practitioners nor scholars are focusing on experiential education that affords young people objective metrics that quantify their improvements in collaboration between diverse sides, it is a curious situation. In a world replete with hunger, inequality, injustice, and unemployment – much of which is caused by or compounded by division and hostility between people in win-lose relationships – why are educators not providing children with numerous activities that measure progress at accomplishing goals in collaboration with people from diverse cultures, classes, and communities. Why are scholars not studying the impact of activities that provide players data with which to measure progress in improving cooperative performances?

If inventing games was a difficult task or if measuring cooperative performances was significantly more complex than measuring competitive performances, that might

explain the lack of research, development, and delivery of games that keep score of cooperative performances.

Fortunately, inventing games is easy and enjoyable. Children invent games relentlessly – maybe they are wired to invent games. Some of their games – such as catch – keep score on a win-win basis such as counting the number of times they can catch continuously without dropping the ball. Keeping score of cooperative performances is slightly more difficult than keeping score of competitive performance – two games are required to determine if both sides won or lost. The author's experience is that children catch onto novel scoring systems more quickly than adults.

Perhaps the best explanation for the limited number of games in which adults teach children to keep score of cooperative performances is the cultural bias in favor of the status quo. As noted in Chapter 1, the Olympics were developed to train soldiers, therefore the games served a function essential for the military and may have created a mental framework that has created the impression that win-lose contests are the only way contests can be scored. Also, win-lose contests are engaging for players and often entertaining for observers. Furthermore, the process for scoring win-lose contests is intuitively obvious. These observations may explain the preponderance of win-lose contests and the paltry number of win-win contests.

The encouraging news is that computer game designers and board game designers are exploring the realm of games that keep score of cooperative performance. Perhaps, the scholarship will grow when the findings are positive.

If this study explores a novel problem that has not been prominent in scholarly research and makes tentative steps toward answering the problem, that may be a contribution. The teachers' answers to the research questions indicate potential benefits.

Findings regarding character education. For the author, the most important findings from the interviews and his experiences facilitating ICPD workshops pertain to productive and peaceful relationships – especially between those who are from different classes, cultures, races, or faiths. For example, Ed's dismissal of the idea that he should nurture collaboration among those who do not have productive and peaceful relationships versus Kay's embrace of that responsibility are salient perspectives.

Kay made a short statement (quoted on page 130) about reduction in bullying after the EnTeam workshops. Although she did not elaborate on this statement, it is the heart of the EnTeam process and it refers to one anecdote that illustrates the central issue of respect for those who are in win-lose relationships. This anecdote is presented on page 164 as an example of one area for future research. While the interviews did not reveal any cases as significant as Kay's, the author knows from experience in the classrooms that Kay's experience is consistent with increases in productive and peaceful relationships that have occurred in other classrooms. For example, Ruth's classroom had a diverse cross-section of cultures, faiths, races, and socio-economic classes represented, and Ruth told the author that she saw her students interacting with greater ease and respect after she began teaching with EnTeam games.

Student empowerment. An aspect of character education that is salient in the interviews is that teachers do not see the full benefit from the games unless they empower

students to engage in the games, give students license to make real choices about how to improve their goal attainment, and allocate time for students to learn from experience. Nat admitted that the transfer of control took effort, and Ruth and Al described the mental shift teachers must make to allow students freedom and the support needed to learn from the games. This challenges teachers to make direct instruction concise and relevant to the actions that the students must undertake in the cooperative learning activities.

The primary learning is that students need license and support before they can gather individual data from their performance in collective events and reflect on the data to explore for better strategies that aid their learnings.

Findings regarding academic education. Regarding academic achievement, the interviews produced only a little direct evidence of improvements in test scores attributable to the games. Rae asserted that more students mastered vocabulary in her anatomy classes, and she attributed the increase in the number of students who passed the certified nursing assistants examination to the games. Most of the teachers interviewed asserted that students were more engaged in learning when the curricular content was framed as a game. While it is reasonable to expect academic gains when students are engaged in the subject matter in the classroom, teachers did not give much evidence to substantiate those expectations. The program evaluation of the increase in the number of Ruth's students who were advanced and proficient on the state tests after she started teaching with EnTeam games had serious limitations. Although the teachers give encouraging comments about the academic gains produced by EnTeam games, no definitive conclusions about academic achievement can be drawn from the data available to date.

The most that can be said is that there are many signals that further research is warranted. More research will be needed to quantify the impact of the games on academic achievement of students.

Findings regarding teachers' use of the EnTeam scoring system. Since the process of measuring cooperative performances is novel, teachers are not familiar with using the process in general and the EnTeam scoring system specifically. The data from the interviews repeatedly point out that ICPD has not prepared teachers to use the scoring system independently. For example, Ron and Jan asked for a manual that they could use independently. This is despite support provided to the teachers during the workshops in their classrooms including the game rules, score sheets, debriefing forms, and examples of integration of curricular content into game formats, and demonstrations of how to use these resources. Even teachers such as Ruth and Rae who have used EnTeam games with their students without the support of a facilitator have asked for more support materials.

The lesson for the author is that professional development that leads to measurable changes in the classroom is a challenge, but this problem is not limited to ICPD. Although professional development for educators is widely used by school districts, the evidence of its efficacy is limited. Preparing teachers to use any innovation in the classroom is difficult according to staff from the Institute of Education Sciences: "Recent large-scale, experimental evaluations of teacher professional development programs have not found that professional development training results in improvements in student outcomes, even when changes in teacher practices were obtained" (Garet et al., 2011; *Request for applications: Education research grants*, 2013. p. 22). The challenge is how to address this problem with professional development. Additional research and

development to improve EnTeam professional development may produce a better approach than demonstrations of the games with the teacher's students in the classroom.

Two lessons regarding scoring cooperative performances are notable. First, scores in games are like prices in stores – many factors determine the numbers. It is not accurate to say that the score in a win-win game only measures cooperation. Learning from experience is one of the factors that determines the scores. Second, if the scoring process is going to overcome the free-rider problem, the EnTeam professional development process must improve.

Findings regarding cooperative learning and the scoring process. Research discussed in Chapter 1 shows that many teachers avoid using cooperative learning despite evidence of its efficacy and the endorsement for cooperative learning of leading educators (Abrami et al., 2004; Gillies & Boyle, 2010; Kelly & Fetherston, 2008; Kohn, 1992; Sharan, 2010; Slavin, 2012). Analysis of teachers' under-use of cooperative learning led a team of researchers to make the assertion that there is a significant "gap between the recommendations from theory and research and classroom practice" (Abrami et al., 2004, p. 210) and concluded with a recommendation (ibid):

> Future research should explore ways to increase the classroom use of cooperative learning as a method of enhancing student academic achievement. Increasing teacher expectations of student learning success (effectiveness) while decreasing the perceived costs in terms of teaching time (efficiency) may be fruitful.

Analysis of the interviews show that more work is needed to fulfill this recommendation. For example, the comments by Jan and Ron – see the section entitled *Scoring cooperative performance* beginning on page 109 – show that more is needed for

ICPD to clarify the connection between the scoring process and the free-rider problem. The scoring processes with EnTeam games use the results of the cooperative activity itself as the assessment instrument as explained in Appendix A. When teachers understand this, they see that they can use the EnTeam score sheets to grade individual contributions in team projects.

Teachers needed practice before they could understand and use the score sheets. Al explicitly stated that he had not experienced it before, and the author saw from his work with the other teachers that the process was new to them, also. The professional development will need to become more effective before the potential of the scoring process can be realized.

Once the teachers understand how to keep score of cooperative performances using score sheets, then they have a tool for overcoming the free-rider problem. This will require research and development on the EnTeam professional development and further evaluation before confident conclusions can be reached.

Limitations to the Findings

Some of the limitations and delimitations for the present research were introduced in Chapter 2 on page 98. Further details about limitation to this study are listed below:

- The author is not a dispassionate researcher analyzing the research questions with objectivity and detachment. In fact, the author has a strong bias in favor of the premise that games that keep score of cooperative performance can help to develop children into adults who can make moral choices and become productive citizens who are effective peacemakers.

- The outcomes that the teachers perceived from the games might be attributable to many factors beside the games and the scoring system. EnTeam games are grounded in cooperative learning which has been shown to be highly effective without any direct measurement of cooperative performance. This study does not tease out the different forces at work clearly and distinctly.
- The research design used in this study is open to manipulation and is not the most rigorous qualitative-research methodology possible. Triangulation is lacking and therefore safeguards against manipulations are weak.
- The research cited in Chapter 1 included no studies (other than the few on EnTeam games) that directly addressed the question of whether games that keep score of cooperative performance between teams benefit students, teachers, schools, or communities. Many additional studies – both qualitative and quantitative – will be required before the case for games and sports that use the EnTeam scoring systems becomes persuasive.
- The premise on which this study is based is novel. The idea of measuring cooperative performance in games and sports is not widely discussed by scholars.
- The conceptual model that undergirds the theory of change presented in Chapter 1 needs stronger exposition and tighter connections to the research literature that exists.

- The assertion that scoring systems used in sports are unbalanced and skew popular culture toward a win-lose mindset is an audacious indictment that is bound to face stiff resistance from coaches, athletes, sports fans, and pundits.
- The approach for professional development of teachers offered in this study is only partially developed and requires much further work in the form of professional-development materials for teachers before consistent data can be generated in classrooms.

The first step to resolve these weaknesses is to recognize them and design future studies that address them. Future qualitative research should have sufficient resources to produce findings that meet high standards of validity. Internal validity or credibility and external validity or generalizability of the research can be enhanced by steps such as the following.

. Future research could strengthen the qualitative research by cross-checking the findings using multiple methods of data collection, multiple sources of data, and multiple investigators as a method of determining the validity and credibility of the findings about teachers' perceptions of the results produced by the games (Merriam & Tisdell, 2016). Multiple sources of data should be drawn from teachers, students, administrators, employers, coaches.

Respondent validation. Soliciting feedback from teachers who are willing to review the preliminary findings can increase validity and reliability of the research by removing mistakes produced by misunderstanding their words and actions (Merriam and Tisdell, 2016). By asking the teachers and others if the findings match with their

interpretation of the situation in the classroom when they use the games, the researcher could probe for deeper answers.

Peer review. Validity is enhanced by gathering feedback from colleagues and mentors as the data from additional research accumulates (Merriam & Tisdell, 2016).

One of the lessons the author has learned from this research project is that building these safeguards into the plans for the workshops is more feasible and economical if done in advance. If the ICPD workshops were planned with these considerations in mind, the work could be more valuable to the teachers and the school districts involved. The facilitators might be more effective in their work if they gathered more input from the teachers after the workshops.

Future Research

For the author, the argument in favor of conducting more research into games is supported by the analysis of the interviews of ten teachers presented in Chapter 3, improvements in state test scores at one middle school, interviews with Muslim, Jewish, and Christian families (cited in chapter 1), and over twenty years of experimentation by the author and other facilitators of EnTeam games. What are the next steps with the research and development that will rebalance the skew in popular culture to create experiential education that nurtures win-win relationships? Finding answers to the following questions could be valuable.

What benefits do students, parents, and administrators see in EnTeam games? The present research analyzes the perceptions of ten teachers who experienced demonstrations of EnTeam games and observed their students playing the games. While

the teachers' answers to questions regarding the effects of the games on student character and academic achievement are informative, the teachers' point of view needs to be compared to other perspectives. The perceptions of the teachers should be compared with the views of the students, parents, and administrators. Also, the outcomes produced by the games in various settings and the views of after-school-program leaders, employers, coaches, and others in the community are potential research topics relevant to the issues of experiential education that fosters character education and academic education. Both formats of research – qualitative research and quantitative research – are needed to develop robust experiential education approaches for developing win-win mindsets in young people and their teachers and mentors.

The measurement of cooperative performances and the mindset of learning to win together with people from diverse communities goes beyond what happens in the school, but focusing the future research in the school could help to sharpen the scope of the future research. One of the most basic questions is use of cooperative learning.

Do EnTeam games lead teachers to increase their use of cooperative learning? The benefits of increasing the use of cooperative learning have long been advocated in colleges of education (Johnson et al., 2013; Slavin, 1988) although, as explained above, many teachers are resistant to using cooperative learning. Therefore, the research has the potential to benefit teachers and students if it encourages teachers to use cooperative learning more thoroughly. The research will give teachers the opportunity to voice whether the EnTeam process overcomes some of the objections to cooperative learning and whether teachers are more inclined to use cooperative learning after using

EnTeam scoreboards for measuring cooperative performance as a form of feedback for students when they study together using EnTeam games.

Do teachers see improvements in student character – especially moral character? If one accepts the assertion attributed to Theodore Roosevelt. "To educate a person in the mind but not in morals is to educate a menace to society," moral character should be the foremost issue in education. Evidence that EnTeam games can be used for moral education can be seen by going deeper into a comment by Kay cited on page 130 regarding bullying. Tom Evans was the EnTeam facilitator who was working with Kay. Tom wrote a summary of the situation that had started festering in Kay's classroom before she arrived. As a first-year teacher working with seniors who had been in the program together throughout the previous year as juniors, Kay was faced with bullying and racial conflict between girls in her class of high-school seniors. Tom provided In-Class Professional Development with Kay using a combination of EnTeam concept games and academic-content games. Tom summarized the experience as follows:

In a daily, 150-minute class of high school seniors, two African-American girls were bullying two European-American girls by belittling their achievements and making fun of their focus on school work. The problem was so bad that the high school principal sat in on the class twice a week in response to the complaints from the parents of the two European-American students. The principal and teacher discussed expelling one or both African-American students.

In the EnTeam exercise, *Talking Dominoes* (described in Appendix A), students worked together as a team of four for three rounds. As the facilitator, I paired the two African-American girls with the two European-American girls being picked on. In the

first round, the students paired with their friends and achieved high scores. When one bully and one bullied girl were paired, their productivity was nearly zero. With a facilitator-led debriefing discussion where I asked rudimentary questions that required reflection on the experience and the score, the four girls began a discussion. They identified causes, and listed improvements they could make to work together more effectively in the game, namely respectful, straight-forward, and genuine communication. In the third round where two pairs of bully and bullied were paired together, scores improved dramatically. After the game, the girls spoke about the fact that one does not have to be best friends with someone to be able to work alongside them effectively, but relationships will improve with that mindset. In the following two weeks bullying dropped off and the two African-American girls put more effort into their academic work; both stayed with the program and graduated at the end of the school year. The teacher reported that more harmonious relationships continued for the balance of the school year.

In a recent email, Kay wrote (email from Kay to the author May 15, 2017) about this situation and stated that she agrees with the summary:

> I think Tom touched on everything pretty good in the summary. I definitely [have] seen positive results from the EnTeam activities because the girls who could not get along prior, were working together and achieving good scores by the end of the sessions. I see this as a definite benefit because they will have to work with people they don't necessarily like in the industry!

This experience is consistent with many situations that the author has seen over the years using EnTeam games to score cooperative performances in classrooms. Here,

two African-American girls and two European-American girls saw themselves in a win-lose contest, and that perspective on their relationship caused the four girls to disrupted the productivity and peace in the classroom. The result was that the European-American teacher and principal were contemplating expulsion of two of the four girls.

The teacher allowed the girls to play an EnTeam game. They gathered data on their experience in the game, reflected on the data with the assistance of a thoughtful facilitator who asked questions that encouraged them to use their moral-reasoning skills to develop a new perspective on their social relationship.

Whether or not the four girls became close friends, they developed a productive and peaceful relationship. The class returned to a functioning state. The principal was free to stop coming to the classroom to prevent bullying. The teacher had a successful first year of teaching and did not quit. No one was expelled. Most importantly, four girls left a technical high school with the opportunity to earn a good income and the social perspective needed to become successful citizens in a pluralistic society.

The peacemaking potential of games that score cooperative performance – when combined with effective debriefing and time for reflection – is promising. Although only a few teachers reported that they used the EnTeam games to promote moral reasoning as Kay used it, the few comments teachers made regarding moral reasoning suggest that additional research and development of EnTeam games may be worthwhile.

The author's observation is that children and adults become confused by the cultural norm that sanctions selected falsehoods as ethical without presenting a rich experiential education with the full range of games presented in Appendix E. If this observation is accurate, then giving children a steady diet of games that reward deception

between opposing sides may compound the skew to the culture that tilts toward the win-lose paradigm.

One area that the author wants to explore is the issue of deception in games and in life. When the author sees a group of people who have been in conflict play EnTeam games together and then make the transition to a healthy working relationship (like Kay's students did), one of the salient outcomes is the increased honesty and the decline in deception when people are in win-win relationships.

How can future professional development serve moral education? While the games provided a context that facilitates discussion of moral issues, more thorough research is needed to address the issue of deception that is raised in Chapter 1. Also, teachers need thoughtful preparation before they can take full advantage of the teachable moments for moral education. In the future, this preparation will require sufficient time for participants to experience the fact that the more times a group plays an EnTeam game, the more difficult it becomes to make measurable improvements in performance statistics – and the more counter-productive cheating becomes as players try to make continuous improvements in performance.

In addition to the teacher preparation, the students will need to develop their capacity for moral reasoning. While experiences may provide a context for exploring moral questions and well-constructed questions may engage the students in wrestling with the issues, the process takes time and maturation and cultivation of thought. Research and development in this area are needed to determine if EnTeam games are useful.

The author has observed that even the most essential moral questions – like cheating and bullying – are neglected too often and allowed to fester. The fact that experiential learning can open thought to deep understanding of relationships and values while studying curricular content increases the chances that students will dig deeper into the complexities of moral issues because they have been challenged more often and give more opportunities to reflect than classroom instruction has traditionally provided.

Research regarding professional development in this area is essential. For example, the assumption that attitudes toward other people are rigid and unmalleable for older teenagers or the assumption that character education is not the teacher's responsibility – either of those assumptions undermine the concept model on which EnTeam games are built. The premise behind EnTeam games is that people of all ages and backgrounds can learn to win together in the sense that they can continuously improve their ability to improve in those situations where they interact. Some teachers disagree with the assumption: people do not have to like each other to be productive and peaceful neighbors.

If research is to continue, funding sources will be needed. The challenge is that investigations require talented people who have the luxury of devoting thought and time. School districts operate with limited budgets and with ever-changing governing boards that are not likely to counter the popular will of sports fans.

To organize data relevant to the research questions and lay the groundwork for future research on and development of educational games that keep score of cooperative performance, a wide variety of studies could be useful.

Could classroom applications of game theory increase moral reasoning? As noted in Chapter 1, game theory is a liberating way to think about issues pertaining to competition, cooperation, and problem-solving when people are in interdependent relationships. Additional research and development could explore ways game theory provides mechanisms for quantifying cooperative performance and competitive performance. If educators used game theory as a structure for engaging students in decision making in situations where people have interdependent relationships, students could become more adept at dealing with the problems in daily life as well as global problems of productivity and peacemaking.

Moral issues in the classroom such as cheating, accountability (the free rider problem), democratic decision making, career planning, and other important topics of concern to students and to the world could be incorporated into curricular content in more effective ways. While scholars such as Gummerun and her colleagues (2008, 2014) have made important contributions in this direction, there is a long way to go before game theory reaches it potential for moral education in schools and colleges of education.

If students and educators see that prisoners' dilemma is a useful model for analyzing a situation in which different individuals benefit if everyone cooperates even though the short-term payoff for the individual is higher if one defects from cooperation, then they can reflect on the experience that brings this dilemma to light and develop new perspectives on relationships and strategies in the classroom and beyond. A desired outcome is for players to see that cheating on tests, shoplifting, and other behaviors involving defection from cooperation can be framed as variations on prisoners' dilemma; teachers can then discuss the ramifications of delinquent behavior with students

objectively and engagingly after the students play the game – provided the teachers are prepared thoughtfully.

Further research and development into games such as *Keep on Track*, described in Appendix A, could lead to better use of prisoner's dilemma. This game involves allocation of resources (in the form of balls) that teams share to score points; teams must make choices regarding the allocation that maximizes the number of points they can score individually and in total together. A prerequisite of research into game theory is better professional development.

How can EnTeam professional development be improved? Before conducting additional research on EnTeam games, the recommendations given by the teachers need to be implemented, especially the calls for better professional development. This will require reviewing the training materials and developing a certification process including assessment of whether the games are being implemented with fidelity. This work is underway.

Another step that could be helpful is developing standards for evaluating the use of games and sports as a pedagogy to develop higher-order thinking skills. The research should distinguish between exercises that are little more than drills versus robust games that are entertaining and truly engaging for students and adults. A robust game is one that is continually challenging and appealing to novices and experienced players. Creating robust sports and games requires time and creative thought combined with repeated testing and refining in various settings and diverse groups.

More effective introductions of the games are also needed to find school districts where the administrators will take the risk of bringing in an innovative form of

cooperative learning. The conundrum is that school districts want evidence – trustworthy data showing that the pedagogy will benefit the students and the schools, but until there is a larger basis of data showing that EnTeam games are effective, it will be hard to gain the access needed to collect better data.

Conclusion

This study started with three premises: the first premise is that children need to form mental models of cooperation that are at least as robust as their mental models of competition. The second premise is that the culture taught to children through experiential education in sports and games that keep score of cooperative performances could be one way to improve the understanding, motivation, and skills needed to cooperate with diverse groups of people. The third premise is that children benefit from a balanced diet of both win-lose and win-win games.

EnTeam games were founded on these premises. The author's motive for creating EnTeam games was the belief that children need to form mental models of cooperation that are robust and to experience the benefits of implementing those mental models. One aid in forming and developing mental models of cooperation is the provision of a system for measuring performance in win-win events. Without measurement, it is difficult to assess progress. If there is no scoring process in a game, it is difficult to be confident about winning or losing.

If one accepts these premises and purpose, then it is worthwhile to look for answers to the research questions which ask whether teachers see evidence that children benefit from games that keep score on a win-win basis. In the author's opinion, the data presented in the interviews give a positive answer to the research questions. The real

issue is whether future researchers find evidence that games that keep score of cooperative performances benefit children and the community.

The author believes that both forms of scoring could be valuable for children to learn because many relationships require both win-lose skills and win-win skills; however, children do not typically experience any games that keep score of goals in which one side benefits in an objectively-measurable way by helping the other side.

If others agree that this imbalance in experiential education causes educators to miss an opportunity to help children measure their rate of improvement in overcoming problems with people who are on different sides of issues, perhaps those of like minds will strive to provide opportunities for students to keep score of their performance on a win-win basis. Perhaps the players will learn skills needed to win together with new acquaintances. The players would have data that they could reflect on and use when striving to improve a cooperative performance. They could see what leads to successful collaborations with new friends. This reflection could lead to actions by children and educators that increase the scores they achieve in cooperation among diverse people. This increase in cooperation could possibly lead to greater productivity in the economy and more skillful peacemaking in society.

Future research could expand to include other ways educators could use games to develop students' understanding, motivation, and skill in winning by achieving goals with people from other sides of a divide. Whatever divides people into unproductive conflicts is the enemy of wellbeing and happiness. The next step is to find settings and researchers to analyze the use of games that keep score of cooperative performance between people from different communities, classes, and cultures. Then educators –

including parents – may increase their confidence that such games prepare youth to create more productive and peaceful relationships.

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Contents

Appendix A. Description of EnTeam games

Where Do Organized Sports and Games Focus Children's Attention?

In science, industry, education, medicine, and business the process of measurement is essential for assessing performance (Drucker, 1973; Zak, 2013). For 16 years, measurement was central to the author's work at an industrial real estate company doing market studies estimating the value of buildings, lands, and other assets involved in buy-sell transactions. During those years, the author coached and kept score for some of his children's sports teams including baseball, soccer, and basketball. These experiences at work and play – plus lessons learned from teaching economics – led to questions that have impelled the following research study on the impact the scoring systems used in sports and games – especially the process of keeping score of winning and losing – have on children.

One of the salient lessons that business experience taught the author is that if either the buyer or the seller feel like a loser after a business transaction, there was something wrong with the deal. Unless both parties feel like winners after the exchange, the aggrieved party is not likely to want to do future business with the other side in the transaction. Therefore, business brokers need skills in resolving the conflicting interests of the buyer and seller (as well as bankers, appraisers, lawyers, and others) involved in a transaction. In other words, skills in creating win-win relationships are valuable skills.

Reflecting on these experiences led to the simple observation that win-win relationships involve different skills than win-lose relationships. There followed a series of questions the author began asking in the 1980's about whether the mental models of cooperation in American society are as well developed as the mental models of competition:

- What do parents teach their children when parents' first question after a game is, "Who won?"
- By growing up in a culture where the only scoring process is win-lose, does the scoreboard foster an illusion in the minds of children (and adults) that daily life consists primarily of win-lose contests?
- What would happen if children were taught to keep score in more ways?
- Could a scoring system that tracks players' performance in collaboration with "the other side" increase the social and emotional intelligence of the players and their coaches?
- Would tangible experience and objective evidence that win-win relationships can be as engaging, challenging, and enjoyable as win-lose relationships make win-win relationships less abstract and amorphous than they appear to be today?
- Would human relationships become more productive and peaceful if adults taught children games that keep score of cooperative performance and challenged different sides to bring out the best in each other?
- Could the efforts to reduce corruption in government and business be more effective if people grew up attending schools and participating in after-school activities that included a wide range of games with players from different sides thinking together about the choices they made and the effects of dissimulation, cheating, integrity, equity, and other moral issues?
- What would happen to the economy if children grew up with games in which the scoreboard implies that unless everyone is winning, everyone is losing out on the talents and contribution of some of the players?

- Would homelessness and unemployment be scored as a loss for the whole community if role models and thought leaders participated in sports that keep score on the premise that if we are not all winning, we are all losing in the sense that we lose the talents and capabilities of some people?
- In an economy where technology is on the verge of replacing truck drivers and robots are replacing workers in manufacturing, banking, retailing, and other areas, what would happen if children grew up with the idea that if we are not all winning, we are all losing out on the talents and creativity of those who do not have an opportunity to contribute to the success of the community?
- Could the scoring systems used in games nurture the notion that the economy will not be short of opportunities for creative workers until it runs out of problems that need to be solved?

This type of questioning led the author to ask athletic directors and educators in the 1980's for games that keep score of cooperative performance between teams, but the search was fruitless. Since he could not find any sports and games that keep score based on win-win skills, the author began inventing games in the early 1990's using concepts derived from economic game theory. The first large-group test was in 1993. Eventually, a system of games developed, called EnTeam games described below, that keep score of how well different sides do at working together with people who are "on other sides."

Definition of EnTeam games. A wide variety of physical sports, table games, and academic games can be classified as EnTeam games so long as they keep score of cooperative performance between different teams or different individuals working together. The essential feature of EnTeam games is that all players lose together or win together depending on whether

they can improve their performance each time they play a game together. Performance is measured by the achievement of objective, observable goals that are scored by the collaborative effort by all of the players.

The types of EnTeam games most relevant to the subject research are the academic games because they provide a framework into which educators may insert the content they want to teach. While the EnTeam academic games are of primary importance for the subject study, the physical games are also useful in the classroom as a simple framework for introducing students to the process of scoring cooperation and engaging teachers in facilitating students in reflection on the implications of positive interdependence and negative interdependence.

EnTeam academic games. EnTeam games do not include curricular content. The educator must supply the curricular content pertinent for the subject such as math or language. EnTeam games support character education because they provide a context for students to measure cooperative performance and explore ways to bring out the best in each other as they try to master the curricular content together.

EnTeam games are structured as non-zero-sum games defined as any activity in which the benefits that accrue to one participant also add benefits to the other participant; a zero-sum game is any activity in which the benefits that accrue to one participant also subtract from the benefits of the other participants (Stevens, 2008).

The scoring process inherent in EnTeam games is different from traditional scoring methods because players on different teams win together or lose together based on their ability to achieve goals collaboratively in a series of iterations of play. The objective of the games is to increase the number of mutually beneficial outcomes that two sides can produce together each

time they play. Examples of the both the academic games and the physical sports are presented below.

In EnTeam games, players compete, but not against each other. The opponents in EnTeam games are not other people; the opponents are impersonal obstacles such as time, distance, ignorance, fear, or other impediments to performance and goal attainment. Winning or losing against impersonal opponents can be identified by the progress of the scores of a series of repeated plays of a game. If the performance statistics improve in a series of two or more games, the teams are winning together. If the score does not improve in consecutive games, the teams are losing together.

The motivation for developing EnTeam games is to give people a mental model of cooperation that is as complete and robust as the existent mental models of competition. The ultimate purpose of using EnTeam games is to increase productivity and peace in communities.

Examples of EnTeam games

Before teachers use EnTeam games in the classroom as pedagogical tools for curricular content, it helps the students to have had experience using the scoring process with a simple game. After students understand the way to measure their ability to help each other, they are prepared to study together using an academic game. If the students do not know the scoring process before they try to learn academic content, they are learning two things at once and become confused. Therefore, it helps to start with a concept game that gives students the opportunity to keep score of cooperative performance before they work on the academic subject. The concept game can be taught in any subject area. For example, a physical education class could be an ideal setting for introducing the EnTeam score sheets while playing the following game.

Example of a concept game. When teams play EnTeam volleyball they use the standard volleyball and net. The game differs because the objective is to race against the clock to get as many volleys as possible in three minutes. Therefore, one side is not trying to hit the ball such that the other side cannot return it, but such that the other side *can* return it.

In EnTeam volleyball, players from each team are on both sides of the net. Before the game starts, players from the two teams get acquainted and plan their strategy together.

The rules specify that after the ball is served over the net, everyone on the receiving side of the net must hit the ball at least once before one player hits the ball to the opposite side of the net but not twice in a row. If the ball crosses the net successfully, both teams score one point because both teams contributed to the accomplishment of their common goal. The receiving side repeats the process of each player hitting the ball at least once. When the time for the first game is up, the both teams have the same score.

Between games, teams strategize together to improve their collective scores. A match consists of each team playing one game with each of the other teams. At the end of the match, the teams have individual scores, collective scores, and a match score. The scores reflect the performance of the teams individually and collectively. The teams win together if their combined scores improve each time they play. If the score does not improve, they lose together. For example, Figure 7Figure 7 below shows scores for four teams at the end of the match. These teams have won because their combined scores improved each round of play from 44 to 46 and finally 54. If these teams played again, they would win the second match if their match score exceeded 144.

	North	South	East	West	Team Scores
Game 1	10	10			Four scores from games 1&2
Game 2			12	12	44
Game 3	11		11		Four scores from games 3&4
Game 4		12		12	46
Game 5	14			14	Four scores from games 5&6
Game 6		13	13		54
Individual Scores Add down the columns	35	35	36	38	**Match Score** 144

Figure 7. Completed EnTeam score sheet for four teams

The figure above shows that these four teams won this match together because their combined team scores improved each time they played. They would have lost together if the combined scores had not improved. The individual scores show that their cooperative performance were very similar. West had a slightly higher score than the other teams, but not enough to draw any conclusions. If the individual scores had greater variation, there might be more to discuss about individual differences.

Between games and after the match is over, the players can benefit from considering what happened, identifying the lessons learned, and planning how to use what they have learned. The discussion might start with the following questions:

- What strategies and methods worked as they got to know each other tried to improve their score?
- What was not helpful in building teamwork between teams as they played together?
- What would they do differently if they had the opportunity to play again?

- What are the lessons from the game that could improve communication, cooperation, and teamwork off the court?

Questions like these give the players the opportunity to reflect on the experience and are essential to completing the learning process. A well-facilitated discussion can make the experience more valuable.

Description of an EnTeam academic-content game. EnTeam academic games use a scoring system that is similar to the physical games described above: students are working together to accomplish a goal that they cannot achieve alone and keeping score of the number of times they can score the goal. For example, math students can play the EnTeam game *Too Many Problems to Solve* to build skills in solving problems that warrant practice and repetition.

For example, if the learning objective is for students to help each other remember how to compute area and circumference of circles, the teacher can use EnTeam scoring to measure cooperative performance of the students as follows:

- In each pair of students, one person is A and the other is B.
    - Both students must do half of the work.
    - Partners may talk and help each other, but must do their own work to solve his/her individual problem.
- The teacher gives a fixed time (e.g. 4 minutes) to complete the following tasks:
    - Student A computes the area of the even-numbered circles and the circumference of the odd-numbered circles.
    - Student B computes the circumference of the even-numbered circles and the area of the odd-numbered circles.
    - Both students check each other's work.

The score for both students is the number of circles with both computations done correctly. Circles with only one calculation do not count in the score.

After the time for the first game is over, students score one point for each circle with correct calculations for both area and circumference. All of the scores for all of the pairs of students are added together to compute the class score for the first game. Before students rotate partners for the second game, they need to reflect on their experience and plan strategy so they can win together by beating the combined scores for all the pairs of students. For their next game they will have similar problems and different partners. The debriefing may involve the teacher asking questions derived from the behaviors the teacher observed during the game. For example, if the teacher sees one student doing another student's work, the teacher might ask questions that about the harm caused by that form of cheating and how the future score will be enhanced if they face the need to bolster the weak student's skills before the next game starts.

The class wins if the score improves each game they play. The class loses if the score does not improve each time they play. The students lose together or win together based on their ability to continually improve.

The relationship between the academic games and the concept games (such as EnTeam volleyball described above) is that the concept games create conceptual metaphors in the minds of students and prepare the students to reflect on the scores they earned together and collaborate to develop strategies that enable them to improve future scores. Thus, the scoring process reinforces cooperative behaviors that are primary objectives for cooperative learning and character education.

Below are a few examples of concept games and their correlative academic games. These games are empowering for students if teachers follow the principle: students are free to use any strategy they choose during the game so long as they adhere to the rules.

Talking Dominoes and Talking Ideas

Talking Dominos (concept game)	Communication and leadership exercise: builds skills in describing, listening, interviewing, and giving directions.
Talking Ideas (academic content game)	*Sequel to Talking Dominos* Take turns interviewing and summarizing: builds skills in framing questions, interpreting answers, and writing ideas gleaned from the interviews.

House of Cards and House of Ideas

House of Cards (concept game)	Problem-solving exercise; requires planning, creative thinking, collaboration, and time management.
House of Ideas (academic content game)	*Sequel to House of Cards* Partners work together to build ideas into a logical presentation: builds skills in creative thinking, expository writing, and teamwork.

Keep on Track and Keep on Topic

Keep on Track (concept game)	Goal-attainment exercise; requires planning, team thinking, collaboration, and time management.
Keep on Topic (academic content game)	*Sequel to Keep on Track* Partners work together to identify and achives goals that require collaboration within an team and benefit from collaboration between teams to increase the total score for the community.

The professional development for teachers who desire to use EnTeam game includes training in the use of concept games in sequence with their correlative academic games.

Robot Control Game is an example of a game that integrates math and science and that fits within the category of Keep on Topic academic content games. Following are the teacher instructions and the student instructions for Robot Control Team:

Robot Control Team – teacher guidelines

Learning objective: students will work together to create and use linear functions.

- This game is a sequel to *Keep on Track* because it requires students to work together to achieve a goal that requires collaboration. Teams also collaborate by sharing strategies.
- The class wins together or loses together depending on whether they can improve their combined performance between games 1 & 2 and games 2 & 3.

Common Core State Standards: CCSS.Math.Content.HSA-CED.A and others e.g. modeling

Class time required: depending on the readiness of the students to create graphs, more than one period may be needed for a match including debriefing; a match has 3 games.

Equipment: paper; pencils; measuring tapes or reference points such as seams on floor tiles; post-it notes or other place-markers; timer or clock with second hand; EnTeam score sheets; two copies of *Robot Control Team* page for each team (see attachment); a textbook that explains the skills required of students.

Skills that students use together:

- Make graph of time and position: seconds (on X axis) and distance (on Y axis)
- Compute slope using rise over run.
- The graph can show speed and direction.

<u>Suggested</u> sequence for the game:

A. Introduce the game objective: *Tell a "robot" how to move by making line graphs that show speeds and directions along a straight path for 15 seconds.*

B. Form teams of 3 (or 4) students per team and number the teams.

   - Teams of 3 have 1 robot on 1 path. Teams of four have 2 robots and 2 paths.

C. Let a student read the *Robot Control Team* page to the class.

D. Instruct the students to write their roles on the row of the score sheet for game 1:

   - On teams of 4 students, A is Programmer for B, and D is Programmers for C.
   - On teams of 3, A is Programmer for B, and C is Time Keeper for game 1.

E. Allow students to use the textbook or a model. Keep explanations short. Encourage teammates to help each other make sense of the activity.

F. Model how to prepare graphs and mark a robot's path then let students practice.

G. First round, odd-number teams observe and score even-number teams doing the activity using the rubric. Then teams rotate and even-number teams observe and score.

H. After teams grade papers and return them, each team records its score on its score sheet.

I. Instruct students to rotate partners for game 2:

   - On teams of 4 students, C is Programmer for A and B is Programmers for D.
   - On teams of 3, C is Programmer for A, and B is Time Keeper.

J. Repeat steps F-H.

K. In the third game, teams of 4 choose who will be the programmers; in teams of 3, A is the Time Keeper, B is Programmer, C is Robot.

Robot Control Team – handout for students

Game objective: Program a "robot" to start, stop, and move at speeds shown on a line graph.

The graph shows speeds and directions along a straight path for 15 seconds.

Roles for students (on some teams, players may have two roles)

- Robot – follows directions as shown on graph made by programmer.
- Programmer – creates a graph telling the robot how far and how fast to move.
- Timer Keeper – keeps the robot moving at the right speed and on time.
- Positioner – marks the points where the robot changes speed.

Game rules (a match has 3 games)

1. Before the clock starts, each person prepares a graph:
    a. Teammates can talk together, but each person must do their own graph.
        - Each teammate's graph must have a different slope on one line.
    b. Label **time** (seconds) on the X axis and **position** (ft. or m.) on the Y axis.
    c. The graph must have at least 3 line-segments that connect:
        - Line-segment with positive slope
        - Line-segment with zero slope
        - Line-segment with negative slope
    d. Each person calculates the slope of their line-segments.
2. The path the robot travels must be a straight line.

    Place markers on the floor showing points where the robot changes speed.
3. **Time limit**: 15 seconds per game. All robots in the class start at the same time.

    All teams have time to practice before the clock starts.
4. **Scoring**: Odd-number teams watch and score even-number teams using the rubric below.

    Then the even-number teams watch and score odd-number teams.

5. After each game, change roles. A full match is three games.

Scoring Rubric The maximum score is 6 points per game.

	Oops = 0	**So-so = 1**	**Wow! = 2**
Does the graph have 3 (or more) segments with different slopes?	More than two mistakes	One or two mistakes.	Graph is correct.
Are the calculations of the slopes correct?	More than two mistakes	One or two mistakes.	All calculations are correct.
Does the robot reach the marks at the correct time? Do the marks match the graph?	More than one mark or one time is in error.	Only one mark or one time is in error.	Robot reaches all marks on time and all marks are in the correct locations.

Talking Dominoes

Objectives

Strengthen communication skills including listening, asking precise questions concisely, understanding another person's ideas, explaining your point of view, following directions, giving constructive feedback.

Set up 4 pairs of matching dominoes and 2 folders for each pair of players. Two-minute timer. EnTeam score sheets; 3 or 4 players

Steps and Rules (There is no limit to your work other than the following rules.)

1. If you are using EnTeam score sheets, write names at the top of the score sheet.
2. Divide 4 pairs of dominoes so both partners have one domino from each pair of dominoes.
    a. Player A has one domino from each pair of dominoes; Player B also has one of each pair. Check that the dots on Player A's dominoes match the dots on B's dominoes.
    b. Players C&D set up like A&B (In a team of three players, Player C is the Observer in game 1).

3. Use folders to hide dominoes so players cannot see each other's dominoes.
4. Observers may not talk or give signals during the game. The Observer simply watches the game. Observe does not talk or give signals for 2 minutes. Do not nod or shake head.
5. Players A and D start as the "Senders." (In a team of three players, only A is "Sender.")
    a. Senders put their dominoes into a pattern behind the folder.
    b. All four dominoes must be used and dots must be up (so you can see them).
    c. Once the pattern is set, the Sender may not touch the dominoes.
6. Player B starts as the "Receiver." (In a team of four players, Player C is also a "Receiver.")
7. When the clock starts, the Sender explains to the Receiver how to copy the pattern.
    a. The Receiver may ask questions and give feedback.
    b. Receiver and Sender may talk together, but may not talk with anyone else.

        Do not look at each other's dominoes.

    c. Observer may not talk or help the other players in any way.
8. The time limit for each game is 2 minutes.
9. If the players finish before the time is up, they keep score and continue with a new pattern.
    a. The same Sender creates a new pattern behind the screen.
    b. The pattern and shape must be different.

        The new pattern must change the position of all four dominoes.

10. After each game, rotate partners and change roles. Play three games for a complete match.

    Score

Score 1 point for each domino that the receiver has in the same position as the sender.

Looking over the shoulder of the sender or the receiver the dominoes must be in the same position and pattern. For example, the domino on the left for the sender must be on left for the receiver.

- Maximum score is 4 points for each matching pattern.
- Subtract 1 point for each violation of the rules.

Levels of play

- Level 1 – dominoes are touching and lying flat on the table in a simple shape such as T, L, I
- Level 2 – dominoes are not touching and some are on edge in a configuration with three dimensions. The patterns must match in position and spacing between dominoes.

Talking Ideas

Objective: Use strategies from *Talking Dominoes* to see what others are thinking.

Give each student the opportunity to pay close attention to another student's ideas.

Standards: literacy -- writing, speaking and listening

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade-level topics, texts, and issues, building on others' ideas and expressing their own clearly.

Equipment Paper, pencils or pens, timer, and six open-ended questions

Sequence

1. Form teams of 3 or 4 people per team.
2. Identify person A, B, C, and – in teams of 4 – D.
    a. A and D are reporters in the first round.

   b. B and C are interviewed in the first round.

   c. In a team of three, person C is solo in the first round.

3. Reporters write their names on their papers and the name of the person they are interviewing.
4. Reporters have fixed time to ask about the question and record the answers on paper.
5. When time is up, develop an example or action plan based on at least one answer.
6. Debrief the results.
7. Rotate partners for the next question.

Rules

A. Only written answers count in the score.

B. Answers should be written as complete thoughts.

C. The interviewing partner may not add anything to what the interviewee says.

   a. The interviewer is only a reporter and recording ideas.

   b. The interviewer may ask leading questions but may not create the answer.

Goal: At least one answer with sufficient detail that an outsider can understand the ideas.

.

A&B:

C or C&D:

A&C:

B or B&D:

B&C: A or A&D:

Explanation of EnTeam scoring process

The defining element of EnTeam games is that the players keep score based on the change in their performance together. If the performance improves each time they play, the players are winning together. If the score does not improve, they lose together.

EnTeam games use two approaches to keeping score of cooperative performance: (1) *group-best* scoring and (2) *all-for-one* scoring.

Group-best scoring. Group-best scoring compares a measurable performance achieved by one group of participants in a series of two or more events. The purpose for using group-best scoring is to encourage collaboration among the people in the group such as students in a classroom. Usually, the contribution of any one individual to the score is difficult to discern.

For example, a teacher could use group best scoring in a math lesson by adding up the total number of problems that students in a class solved correctly in five minutes and comparing that first score to the number of problems solved in a subsequent five-minute period. The advantage of using group-best scoring is that players can see whether the teams are winning together – where winning is perceived as improving the total of the combined scores and the chances of winning are enhanced by players helping each other achieve their shared goal.

This math activity would be considered an EnTeam game only if the following conditions are met:

- The type of problems and the level of difficulty are the same each time the group plays.
- The rules and procedures are unchanged each time the group plays.
- The group has time between each event to plan together how they will improve their score.
- The activity concludes with an opportunity for the students to debrief their success or failure and plan next steps.

When conflicts arise in the course of the games, the teacher has the opportunity to engage the students in moral reasoning

The result of group-best scoring is that the participants see whether they are improving as a collective. They do not gain any numerical data on the individual performance of person in the group. To see numerical data on individual performance in a collaborative activity, they can use All-for-One scoring which requires EnTeam score sheets.

All-for-One scoring. To go deeper into measuring cooperation teachers can use *All-for-One scoring* which gives individual performance statistics in cooperative learning activities. As students develop their skills in bring out the best in each other their scores on EnTeam score sheets tend to increase.

Notice that numerical scores are a function of more than cooperative performance. The scores vary based on three factors (Wohlfarth, 2002):

1. Skill in the activity
2. Willingness to use the skill

3. Random chance

EnTeam score sheets. Two types of EnTeam score sheets for measuring cooperation are shown on the following page.

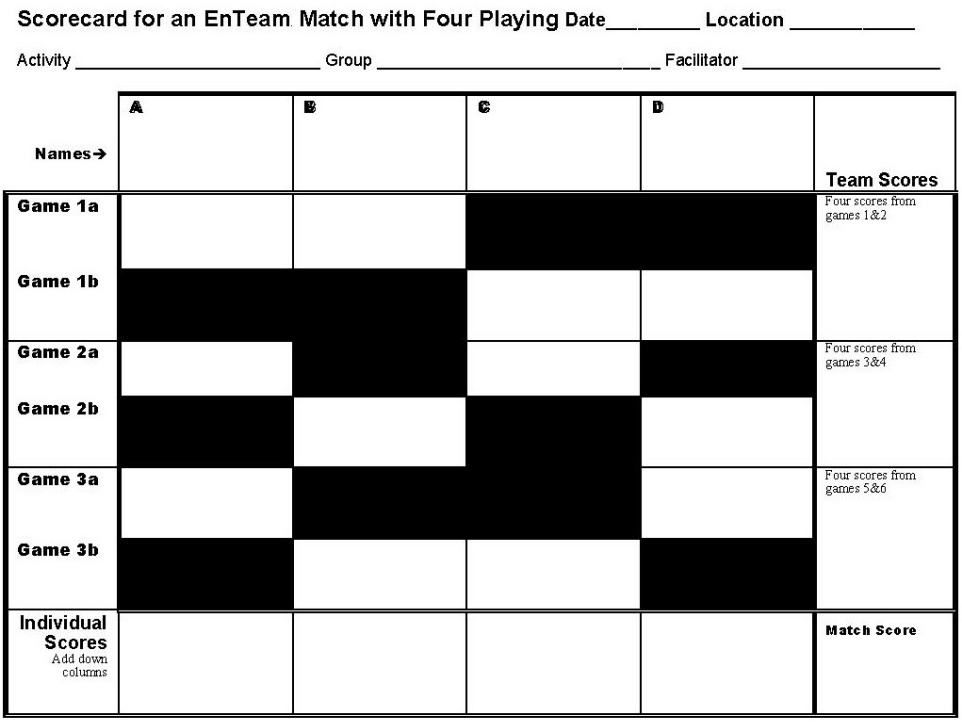
Steps for using the score sheets:

- Select the appropriate score sheet depending on the number of people on each team.
- Enter the names of the players in the boxes at the top of the score sheet.
- After each game, the two partners have the same score. Their scores are identical because they were working together, and therefore **they both own all the points scored by their joint effort**.
- After each game the players record their score and sum across the row.
- Before the second and third games, players rotate partners.

A match consists of three games.

- At the end of the match, the players have three scores.
  - Each person/team has an individual score. (bottom row)
  - Each round of play has a collective score. (right-hand column)
  - The entire group has a match score. (lower-right corner total)

Fig. 3. Blank score sheets for measuring cooperative performance with small groups of players or a few teams of players.

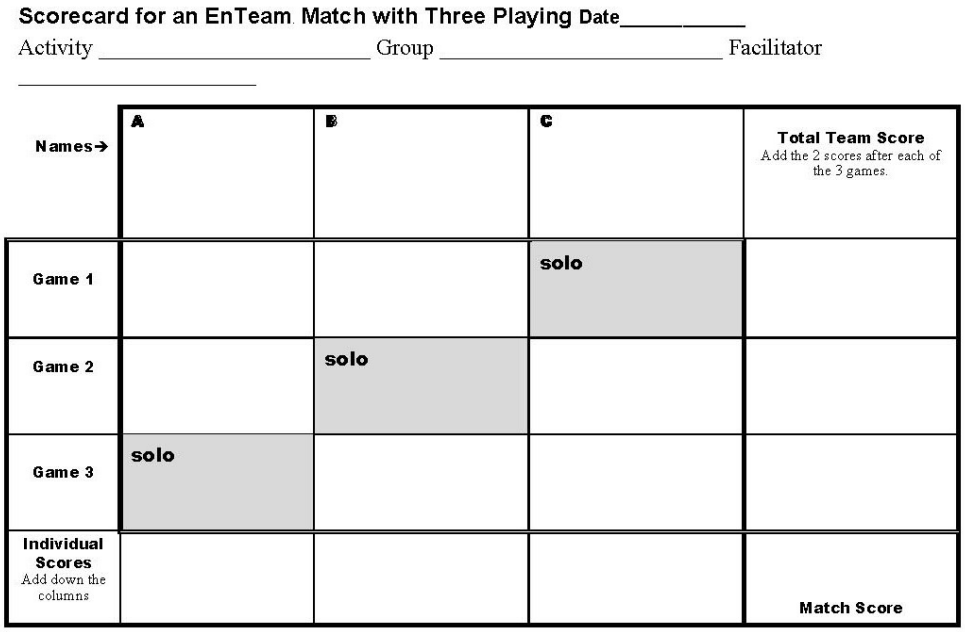


Scorecard for an EnTeam Match with Four Playing Date_____ Location _____

Activity _____ Group _____ Facilitator _____

Names→	A	B	C	D	Team Scores
Game 1a					Four scores from games 1&2
Game 1b					
Game 2a					Four scores from games 3&4
Game 2b					
Game 3a					Four scores from games 5&6
Game 3b					
Individual Scores Add down columns					Match Score

Figure 8. Score sheet for four players or four teams



Scorecard for an EnTeam Match with Three Playing Date_____

Activity _____ Group _____ Facilitator _____

Names→	A	B	C	Total Team Score Add the 2 scores after each of the 3 games.
Game 1			solo	
Game 2		solo		
Game 3	solo			
Individual Scores Add down the columns				Match Score

Figure 9. Score sheet for three players or three teams

The two figures above show blank score sheets that can be used to measure cooperative performance. Individual statistics in the bottom row show how well each student (or team)

performed when working with each of the other participants. The scores on the right-hand column show the progress of cooperative performance between games. The match scores in the lower right-hand corner show the total scores in cooperative performance achieved during the entire match.

Appendix B. Professional development for teachers

Background on EnTeam professional development

Over the years since 1995 when a teacher was first introduced to the EnTeam process of scoring cooperative performance, the methods for introducing educators to EnTeam games have included a variety of approaches and contexts. Most of the professional development workshops have been conducted in conjunction with grants for school districts (for example, federal grants to such as GEAR UP or High School Graduation Initiative). The typical process starts with an invitation to teachers during a staff meeting: *Would you like to use a game to help your students study together? If so, when would you like to meet to plan together?*

The teachers who accept the invitation, meet with an EnTeam facilitator (such as the author or others who are educators experienced in using EnTeam games) and identify an upcoming topic that could be used as a demonstration of the EnTeam process. The teachers who elect to participate in the use of EnTeam games with students in the classroom work one-on-one with a facilitator through the following steps:

1. Introduce the teachers to the rationale for measuring cooperative performance,
2. Ask questions about the learning objectives for an upcoming topic in the curriculum,
3. Demonstrate how to select and adapt an appropriate EnTeam game that engages students while keeping score of cooperative performance,

4. Offer the option of introducing the students to the relevant thinking skills using an EnTeam concept game (a game that keeps score of cooperative performance without engaging players in academic content such as EnTeam volleyball),
5. Model the use of the game and the debrief process with a classroom of students during one period,
6. Support the teacher in using the game with students in one or more additional sections of the same subject,
7. Follow up with the teacher to reflect on the results from the use of the game and plan next steps.

If the teacher has difficulty inserting curricular content into the game format, the teacher and facilitator can repeat the process several times to give the teacher the support needed to implement the games independently. During the training, the facilitator emphasizes the benefits of empowering students to make their own choices and reflecting on the choices and their consequences.

Games have the benefit of teaching students the rule by law if students are free to use any strategy they choose during the game so long as they follow the rules. Specifically, student empowerment means students are free to make decisions in the games without interference from teachers:

- Teachers do not change the rules during the game.
- The rules are written and not oral.
- Students may be referred to the rules and the rules may be enforced, but the rules should not be changed.

- If the written rules are not engaging the students in learning then change the written rules, but do not make up new rules during the game.

Teachers who want to create new games using the EnTeam process can follow the steps for creating a win-win lesson listed below:

1. Start with a learning objective.
2. Find a cooperative opportunity – a process that enables students to accomplish more by working together than by working independently or working against each other.
3. Identify an impersonal opponent (such as time or distance or other impediment) that players must overcome to succeed together.
4. Identify a goal that is objectively measurable and that can be achieved by working together.
5. Arrange the measurement into a scoring process.
6. Define the least-complex rules for keeping the people engaged in reaching the goal.
7. Test it and refine it.

Summary of In-Class Professional Development. Prior to the workshop, the teachers met with an EnTeam facilitator who asked questions about the learning objective, assessment methods, and lesson plan that the teacher had for an upcoming class. The facilitator selected one of the pairs of EnTeam concept games and academic games (known as EnTeam *framegames* – structures into which teachers can insert curricular content to create a learning activity that requires thinking skills) aligned with the curricular objectives set by the teacher. When the teacher wants a demonstration, the facilitator will lead a class in a game. Then, if desired, the teacher and the facilitator can co-facilitate a game. The facilitator also offers to observe and support the teacher using a game with the curricular content.

Following the workshop, the teacher was free to use the EnTeam framegame independently and to ask the facilitator for support if needed. The following table lists the teachers' pseudonyms and characteristics including whether the teachers self-reported that they continued using the EnTeam games after the workshop.

Fidelity to using the scoring process. Teachers who use EnTeam games with fidelity to the scoring process uphold the standards of excellence outlined below. An excellent EnTeam game measures progress toward a goal accomplished through collaboration between individuals or groups who uphold the following standards:

1. There is at least one measurable **goal** that is shared by the people involved.
    a. Some of the goals may be in conflict but there must be at least one goal that is shared. For example, a buyer's goal may be a low price and the seller's goal may be a high price, but the shared goal is to make a transaction that is durable and repeatable. Or a more relevant example for the classroom might be a situation where one student's goal may be to flirt with an attractive classmate and another student's goal may be to recruit teammates for basketball after school, but the shared goal may be to learn and satisfy curiosity – or simply to pass the course and not have to repeat the class.
    b. The goal may be difficult to observe or measure directly, but progress toward the goal can be measured directly or through a proxy. For example, peace may be a difficult goal to measure, but a reduction in the number of fights may serve as a proxy of progress toward peace.

2. The measurement must **compare combined scores** so everyone loses together or everyone wins together depending on whether they improve their progress toward the shared goal.
    a. Some groups will do better than others, but the objective is for the whole community to improve performance, therefore scores are combined to see if the total performance has improved each time they play.
    b. High performing teams should have opportunities to share their strategies so the entire community can improve.
3. **Collaboration** among the people involved should engage each person in working toward shared goals.
    a. Everyone should have a role that engages them productively and measurably.
    b. The types of engagement may differ, but without everyone's participation the goal is more difficult to achieve.
    c. Each person has opportunities to contribute ideas toward achieving the goal.
4. Progress toward the shared goal is **measured multiple times** so the participants have the opportunity to assess their improvement in their work together.
    a. At least two attempts at the goal must be under consistent conditions or the scores are not meaningful.
    b. The level of difficulty should not change every game or the scores cannot be compared. For example, if teams are solving math problems, the level of the problems should not increase for at least two games. The level of the problems should not increase until the players are achieving proficiency at the first level.
5. **Rules** should be clear, impersonal, and consistently enforced.

a. Rule of law, not rule of person, should govern.
    i. One person cannot change the rules during a game.
    ii. Written rules that do not change during the course of the game are helpful.
b. Obedience to the rules should be monitored objectively.
c. The rules should be defined and consistent for each iteration of play. If the rules change, it is a new game and the scores cannot be compared easily.

6. Time for **reflection** between games should give everyone the opportunity to contribute to the improvement of the performance of the group.
    a. Learning comes from reflection. If we don't have time to reflect, we do not have time to learn.
    b. Reflection can come in many forms. It may be individual and in groups.
    c. Ideally, everyone has some way to express the ideas that come from reflection.
7. The **observed outcome** of the activity or game should be greater productivity and peace than can be obtained without the game or activity.

To assess the fidelity to the EnTeam process, the following rubric provides a scoring method:

	Oops =0	Progressing =1	Excellent =2	Comments
Shared goal is...	Unidentified.	Partially identified.	Fully identified and clear to all.	
Scoring is...	Missing or confusing.	Partially understood.	Clearly presented.	
Collaboration is...	Missing or win-lose.	Includes some people.	Engaging for all.	
Measurements are...	Not comparable.	Partially comparable.	Fully comparable.	

	Oops =0	Progressing =1	Excellent =2	Comments
Rules are...	Changing, unclear, or personal.	Partially clear; partially enforced.	Clear and enforced.	
Reflections are…	Missing or too brief.	Partially engaging.	Deeply engaging for nearly all.	
Outcomes are...	Unproductive or disrespectful.	Partially effective.	Productive and respectful.	

Figure 10. Rubric for assessing fidelity to the EnTeam standards of excellence

The rubric above is a scoring guide designed to give teachers feedback on their fidelity to their use of the EnTeam games in the classroom by using the explanation presented on the preceding pages. When a qualified observer is in the classroom watching the game, the observer fills out the rubric. If no observer is present, the teacher may ask students to fill out the rubric, or teachers may fill out the rubric on themselves.

Debriefing for higher-order thinking skills. Teachers can develop critical thinking skills with events that challenge students to draw on their creativity and curiosity. Learning takes place by debriefing and reflecting on the event. Failures offer powerful opportunities for discovery if the learning environment is safe. Appreciate mistakes by gently finding the lessons they contain.

By thoughtful debriefing questions, students learn to reflect and reason inductively from the event to broader perspectives and principles.

The debrief process, at its best, includes each part of Bloom's taxonomy:

<table>
<tr><td rowspan="2">Who? What? Where? When? How? Why?</td><td>Understand the facts in the context of the particular situation.

Compare, contrast, explain, extend, summarize</td><td>Take apart
Probe the causes and motives behind the facts in the particular situation and how they might be generalized to other contexts and related to broader principles.</td><td rowspan="2">Draw conclusions and make choices using the principles identified in analysis and synthesis.

Appraise, award, decide, choose, interpret, prioritize, value, devalue, conclude</td></tr>
<tr><td>Use the comprehension of the facts in a similar situation.
Apply, build, experiment, interview, organize</td><td>Put together again
Discover patterns and new applications or solutions by connecting facts and principles to a broader context.
Reason inductively from the particular to the general, and deductively from the general to a new form of the particular.</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
</table>

Adapted from Benjamin Bloom, et.al. *Taxonomy of Educational Objectives: The Classification of Educational Goals: Handbook I, Cognitive Domain,* 1956

Some open-ended questions to lead students through Bloom's taxonomy:

1. What happened? *[Knowledge, Comprehension, Application]*
    - What are the facts in this experience?
    - How do you compare and contrast the facts in this experience?
    - How could we improve our performance if we had this experience again?
2. So what? *[Analysis and Evaluation]*
    - What lessons did you learn from this experience?
    - What are some of the principles at work in this experience?
    - Given this experience, what implications do you see for your choices or decisions?
3. Now what? *[Synthesis]*

- How do the principles in this experience apply in other situations?
- What actions or opportunities can you create from this experience?

Appendix C. Interview Questions

The interview questions. Questions for the semi-structured interviews are listed below with numbers; the lettered questions that follow the numbered questions are samples of possible probes intended to elicit complete answers, if probes were needed. The instructions to the interviewer were to listen for the answers to the lettered questions and only ask follow-up questions if the teacher did not volunteer sufficient information without prompting. The interviewer was instructed to keep the interview open to follow the teacher's line of thinking and learn what the teacher sees and describes about the impact of the games.

Interview questions and prompts for the semi-structured interviews:

9. How would you describe your experience with EnTeam games in your classroom?
    a. How were you introduced to EnTeam games?
    b. Why did you decide to allow the facilitator to work with you and your students?
    c. What objectives did you have when you used EnTeam games with your students?
    d. How many times have you seen EnTeam games demonstrated by an EnTeam facilitator?
    e. Did the games support the learning objectives you had for your class?
    f. How many times have you used EnTeam games without an EnTeam staff person?

    [If the teacher has led EnTeam game without a facilitator, skip to question 3 below.]
10. [This question is only for teachers who have **not** led EnTeam games independently (i.e. without an EnTeam facilitator present)] Why haven't you used EnTeam games on your own?

   a. What factors (time, training, support, resources, etc.) have affected your decision not to use EnTeam games?
   b. Is there anything that might cause or motivate you to use EnTeam games in your classroom?
   c. If you used EnTeam games, how do you think the games would impact your students?

11. [This question is only for teachers who lead EnTeam games without an EnTeam facilitator present in the classroom.] Why have you used EnTeam games independently?
   a. What factors (time, training, support, resources, etc.) have affected your decision to use EnTeam games?
   b. How often have you used EnTeam games?

   [For teachers who have not led EnTeam games but have only observed the games being led by an EnTeam facilitator, the wording of the following questions needs to be modified from "used" to "seen used."]

12. Regarding the development of character in your students, do you perceive any benefit or harm from using EnTeam games and debriefing the games? If so, how would you describe the effects on student's character from the games, the debriefing, and the scoring process?
   a. Do you see the students treating each other with more respect or encouragement of one another during EnTeam games?
   b. Do you see the students treating each other with more respect or encouragement of one another after the EnTeam games?

c. Do you see any change in the attitudes regarding cheating? If so, how would you describe the change?

d. What obstacles and drawbacks do you perceive from using the games for developing the character of the students?

e. Do you see evidence that students generalize from the games to life outside of the games? If so, can you describe the change or give an example?

13. Have you perceived any effect on the academic work of your students when you used EnTeam games? If so, how would you describe the effects of the games on student's academic achievement?

    a. Behavior: When you use EnTeam games and debrief them with students, do you see any change regarding students' time-on-task, persistence, or other academic behaviors?

    b. Results: Do you see any evidence of a relationship between the use of EnTeam games and the academic performance of students? If so, how would you describe the evidence of the relationship?

    c. Difficulties: What obstacles and drawbacks do you perceive from using and debriefing the games as a process for raising academic performance of students?

    d. Generalizing: Do you see evidence that students study together differently after they have participated in EnTeam games? If so, can you describe the change or give an example?

14. What are your intentions for using EnTeam games in the future?

    a. Do you plan to increase or decrease your use EnTeam games in the future?

b. Does your use of EnTeam game change your view or use of cooperative learning -- you expect that you will use cooperative learning more frequently in the future?

c. If you are planning a change, what motivates your change?

15. What training in cooperative learning have you had?

a. What is your opinion of cooperative learning?

b. How often do you use cooperative learning?

16. Is there anything more you would like to say?

Appendix D. Form teachers use to evaluate EnTeam in-class PD

Our goal at EnTeam is to provide teachers with activities that raise academic achievement by using collaborative learning, and we would appreciate your feedback.

Check one box for each statement

Do you agree or disagree with these statements?	Agree strongly	Agree	Disagree	Disagree Strongly
6. Students **enjoyed** participating in the EnTeam activities.	❒	❒	❒	❒
7. EnTeam activities **support the academic goals** I have for my class.	❒	❒	❒	❒
8. EnTeam activities help students learn to **work together.**	❒	❒	❒	❒
9. The EnTeam **facilitator was effective** in working with me in the classroom.	❒	❒	❒	❒
10. I see value in the EnTeam process of **measuring cooperative performance.**	❒	❒	❒	❒

What did you like best about the EnTeam activities?

How could the EnTeam activities be improved?

How would you describe your experience with cooperative education? Check all that apply

When I was a student my teachers used cooperative learning:

- ❑ Often
- ❑ Moderately
- ❑ Seldom

As a teacher, I have used cooperative learning:

- ❑ Often
- ❑ Moderately
- ❑ Seldom

My opinion of cooperative learning is:

- ❑ Positive
- ❑ Mixed
- ❑ Negative

Appendix E. Taxonomy of ways of winning

The concept of winning is many-faceted: the following table provides a taxonomy for comparing four ways of winning in representative contexts for winning (Wohlfarth, 2002).

- The second and third columns in this table are about traditional sports and games: the contrast is between situations in which opponents keep score based on negative interdependence between opposing sides with defense (column 2) or without defense (column 3).
- The fourth column pertains to EnTeam games and therefore keep score based on positive interdependence uniting different sides.
- The fifth column pertains to situations where the activity is done by an individual with no relationship to others because the activity is undertaken by a solitary individual or a solitary team.

Table 7 Taxonomy of ways to win

Ways to win	Win through domination	Win by out-performing	Win by collaborating	Win by self-improvement
Definitions	Opponents striving to reach mutually exclusive goals. Something that helps one side, will usually hurt the other side.	Multiple opponents striving for a common goal but not trying to stop one another.	Partners striving to reach mutually compatible goals. They can help each other succeed if they cooperate.	An individual striving to reach a goal independently. The individual measures progress by tracking progress toward the goal.
Key differences	Both sides use defense and offense. The defense tries to stop the success of the other side. If one side wins, the other side loses. It is a win-lose contest.	No defense. Each participant is striving to be better than all the other participants. Often there is only one winner and many losers.	Both sides are working together against impersonal opponents. The success of one side may improve the chance of success for both sides. Both sides are in a win-win relationship.	Only one participant or party is needed. The individual unit is trying to improve relative to past performance. (An individual unit may have many members.)
Zoological examples	Lion and antelope When a lion hunts an antelope, the lion wins if she kills the antelope. The antelope wins if the lion misses a meal.	Antelope and buffalo Both species compete for the same water and grazing land.	Shark and remora A remora is a small fish that attaches itself to a shark or other larger fish. The remora eats scraps left by the shark and removes parasites from the shark. Both benefit by the relationship.	Fledgling A young bird wins mobility by learning to fly through its own effort and persistence.

Ways to win	Win through domination	Win by out-performing	Win by collaborating	Win by self-improvement
Education examples	Grading "on a curve" Teachers who assign a predetermined percent of students to each grade; this creates an incentive for students to withhold information from other students.	Scholarships A foundation that offers a scholarship to the student who writes the best essay creates competition between students.	Mastery-based grading Teachers who assign the same grade to all students who achieve an objective standard of excellence. This creates an incentive for students to help each other.	Independent study A student who works alone improves by individual effort.
Military examples	War Both sides are trying to win the war but only one can succeed. Both armies use offensive and defensive tactics.	Arms race Goal – to prevent war by intimidating the opponent not to attack.	Diplomacy Goal – to negotiate peace without war. If diplomacy is successful, both sides win. (If one side feels cheated, they may go to war.)	Sharpshooter A soldier may improve in marksmanship without the involvement of others.
Legal examples	Lawsuit Conflicting parties take adversarial positions such that if one wins the other must lose.	Patent race Two inventors may race to be first to patent the same invention.	Negotiation Conflicting parties may explore for ways to meet the needs of both sides. With skillful negotiation, both sides may be better off after the deal is done.	Problem prevention A lawyer may reduce the chance of conflict by thorough research, thoughtful planning, and writing a contract or law free of ambiguities.

Ways to win	Win through domination	Win by out-performing	Win by collaborating	Win by self-improvement
Business examples	Manufacturer with a patent Other manufacturers may lose the opportunity to implement the patented idea.	Restaurants striving to attract customers. Competition based on price, quality, ambiance, service improves the dining experience for customers.	Buyer and seller making a deal If the deal is successful, both parties are better off. If one cheats the other, the both lose in the long run.	Statistical process control One company can improve its product by reducing variability in product quality.
Social examples	Courtship Two suitors who want to marry one woman. Defense is any action one suitor takes to keep the other suitor away.	Beauty contest Many contestants compete against each other to win the contest.	Marriage If two people have a happy marriage, they both win. If they have an unhappy marriage, they both lose.	Moral reasoning An individual may develop a successful solution to a social problem by thinking about it alone.
Team sports examples	Baseball A successful team must score its own runs and stop the other team from scoring runs. Offenses and defense are both important.	Relay race Teams of runners compete to be first to run the distance. No defense is allowed.	ENTEAM net-baseball Two teams can both improve their standings in a match by scoring runs together. Two teams work together if they can improve their performance each time they play.	Hacky-sack A group may win by improving the number of times they can pass a ball without the ball touching the floor. The group wins if they can improve the group score. No other team needs to be involved.

Ways to win	Win through domination	Win by out-performing	Win by collaborating	Win by self-improvement
Individual sports examples	Tennis Offense is any hit that has the potential to score a point. Defense is any attempt just to keep the ball in play and avoid losing a point.	Track Each runner strives to reach the finish line first. If one runner touches another, both are disqualified.	ENTEAM tennis Two individuals can both increase their score by sustaining a rally that beats their previous performance.	Track A runner striving for a personal best may win (or lose) as measured by the clock irrespective of the performance of other runners.
Card game examples	Poker Players may use bluffing as both a defensive and offensive strategy	Fish Players race to assemble the most "books" (4 cards of the same rank). There is no defense.	ENTEAM poker Players collaborate to overcome the statistical odds inherent in poker.	Solitaire One player wins or loses based on skill and luck.
Board game examples	Chess Simulates military strategy. One player wins by entrapping the opponent's king while protecting one's own king from attack.	Darts Each player is striving to be the most accurate. There is no defensive strategy.	ENTEAM chess Players work together to convert pawns into queens in 50 moves. Winning and losing are determined by relative performance of players in rotating pairs.	Cross-word puzzles One player wins (or loses) based on his or her imagination, effort, and vocabulary.

Table 7 above compares the alternative ways to win and suggests a range of choices available to educators when they design or select game structures. When teachers make explicit comparison of the ways players are winning, teachers can encourage students to identify the type of relationship they are creating by the games they choose to play. And using the principles presented below regarding negative interdependence and positive interdependence to change the structure of the game, students can identify choices that enable them to transform win-lose situations into win-win relationships by comparing the structures that they choose to use for an activity.

Appendix F. Summary of themes and sub-themes with quotes from teachers

Theme / Sub-theme level 1 / Sub-theme level 2	Representative quote from a teacher
Teachers' overall opinion of EnTeam games	
Student engagement	Dee: "…before they would practice independently on their own and just come to me for the skills test. Now they depend on each other."
Scoring cooperative performance	Al: "Well, it was definitely new for me. I had no experience with that -- it's a way of scoring a game."
Character development	
Peer-support among students	
Social perspective taking	Dee: "They really have to depend on each other, to listen, and to focus in, to trust who they're with…"
Peer-leadership	Ruth: "…kids who had the basic content were enriched, and I was able to help kids who didn't have basic content…"
Empower students by delegating control	Nat: "This [academic game] structure turned around their whole mindset as far as they are now the bosses... [students become] the CEO of the classroom…"
Under-emphsis on moral reasoning	Kay: "there wasn't as much, I guess you'd say, bullying going on after using EnTeam"
Academic impact	
Feedback	Lea: "Oh, wait a minute. I need to go back…too many of them do not know how to…"
Learning through reflection	Rea: "We do the *pros and cons*: 'This worked well.' 'Next time, we should do this better.' and the students got very good."
Teacher services	

Theme Sub-theme level 1 Sub-theme level 2		Representative quote from a teacher
	Teachers enjoy teaching with games	Ruth: "I really enjoyed it. I was less stressed and teaching was more fun"
	Future services	Jan: "We would need some help with that, right?"
Administrative support		Ron: "The district …really wants … for us to speak less and allow the kids to be more investigative and do their thing…"

Appendix G. Games and Play

Games include a continuum of diverse activities ranging in form from unstructured, purposeless diversions to highly structured simulations of life with enforced rules, defined roles, and scoring mechanisms for measuring performance (Caillois, 1961; Epstein, 2015; Garris, Ahlers, & Driskell, 2002; Kreps, 1990). Various taxonomies of games have been developed; for example, a frequently cited categorization divides games with three headings: games of skill, games of strategy, and games of chance (Peregrine, 2008; Roberts, Arth, & Bush, 1959; Roberts & Sutton-Smith, 1962; Sutton-Smith, Roberts, & Kozelka, 1963). In their discussion on the use of games as vehicles for engaging students in considering choices in the face of ethical dilemmas, Schreiber, Cash, and Hughes cite Schell's 2008 definition of games as "problem-solving activities, approached with a playful attitude" (Schreiber et al., 2011, p. 74).

The study of games is complex because the word *game* has over a dozen definitions according to one dictionary (*Merriam-Webster 11th collegiate dictionary*, 2008), and while the foremost definition is "a physical or mental competition conducted according to rules with the participants in direct opposition to each other" there are also contradictory definitions that mean nefarious disobedience to rules as in "gaming the system" (McGonigal, 2011, p.19).

A seminal book on games by Huizinga takes the position that games are removed from daily life in the sense that "…play is not 'ordinary' or 'real' life. It is rather a stepping out of 'real' life into a temporary sphere of activity with a disposition all of its own." (Huizinga, 1938, p.8). Huizinga's conceptualization of games is more philosophical, rarified, and esoteric than those who see games as utilitarian training grounds for specific skills (Garris et al., 2002).

For the present research, the most comprehensive and relevant definition of games is provided by economic game theory which refers to games as simulations with which one can

create models of life situations in which players interact under the constraint that the decisions of one player influence the choices available to the other players (Osborne, 2003; Stevens, 2008). By this definition, marriages, business transactions, student-teacher relationships, diplomatic negotiations between nations, and biological interactions between parasites are all examples of contexts for games (Colman, 1982). It is the presence of interdependence and differences in benefits that accrue to players that characterizes a game according to game theory (Colman, 1982; Stevens, 2008). More on the application and relevance of game theory to the use of EnTeam games in the classroom is presented below in the literature review regarding game theory.

One common characteristic of all games is that they involve a multifaceted concept called *play* – another amorphous term that is defined in diverse ways by educators, psychologists, and common usage (Brown, 2009; Caillois, 1961; Garris et al., 2002; Golinkoff, Hirsh-Pasek, & Singer, 2006; Huizinga, 1938; Mayer, 2014; Work, 2016). Shakespeare summarized the breadth of play:

> All the world's a stage,
> And all the men and women merely players;
> They have their exits and their entrances,
> And one man in his time plays many parts
>
> Shakespeare, *As You Like It*

For purposes of the present research, it is sufficient to define play as the attitude of the participants in a game; these attitudes can range along a wide continuum from light-hearted foolishness to deadly serious approaches to life fostered by military war games play-acted by soldiers as well as by children (Brown, 2009; Huizinga, 1938; Kark, 2011).

The following chart distinguishes among the varieties of play and games along a continuum of organizational frameworks for games from highly structured to unstructured and a continuum for attitudes in play from carefree to serious.

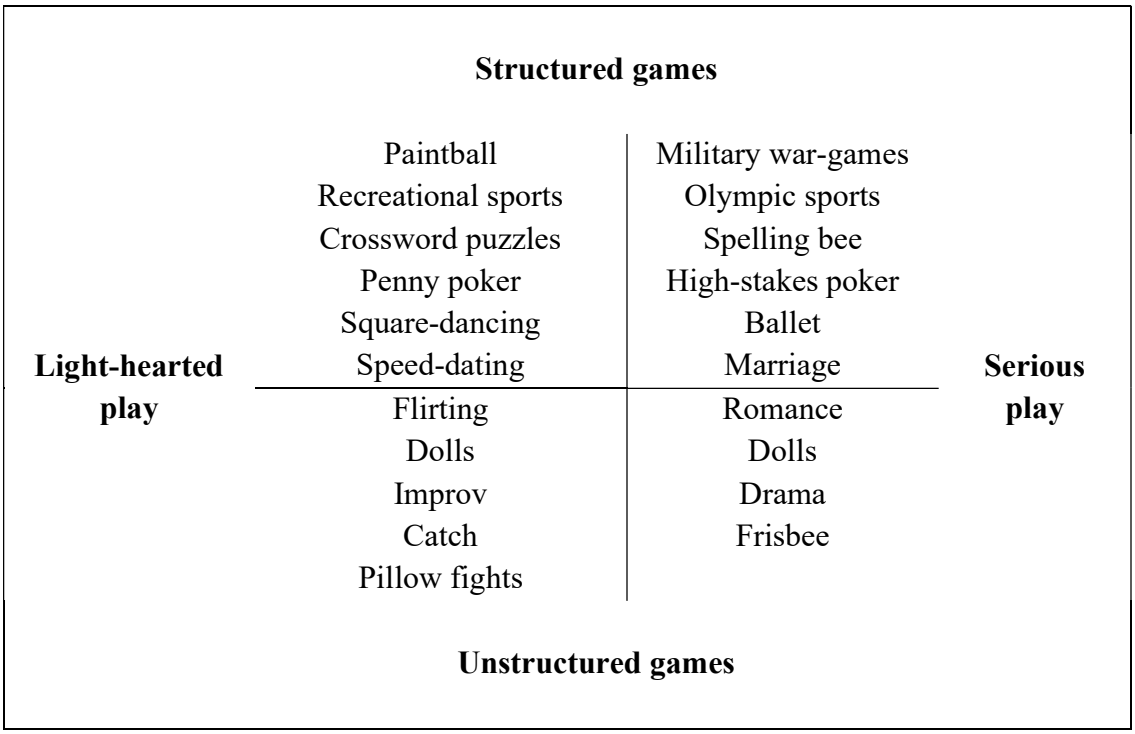


Figure 11. Continua for the attitudes toward play and the frameworks for games including a few examples for each quadrant.

In Figure 11 above, *game* refers to the structural framework or context of the activity (especially relevant for the study is the presence or absence of rules and scoring mechanisms) and *play* refers to the frame of mind with which the participants approach the activity. The four quadrants of the chart give a simple taxonomy for sorting various activities regarding the attitude of the players and the level of structure or ambiguity designed into the game rules, if any. Players can move the same activity from quadrant to quadrant by changing their attitudes and their obedience – or disobedience – to the rules of the game.