Increase Team Cohesion by Playing Cooperative Video Games

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Abstract. Team building activities such as collaborative video gameplay requires a collective effort by players to achieve a common goal. In a business environment, increasing cohesion can improve performance while in a military environment, increasing cohesion can affect morale and combat efficiency. This study measured group and individual cohesion factors with the result revealing that playing a cooperative video game with a minimal time and financial commitment makes it a viable team building activity to increase team cohesion.

Teamwork

Teams have become increasingly important within an organization [1][2] and can only be effective to the extent that team members work cooperatively with each other [3]. Whether it is a software engineering team, a military unit, an acquisition workforce, a sports team, or any organization in which a group of people cooperative to achieve a goal, effective teams are critical in order to achieve success. In order to cooperate, there needs to be a task aligned with a common goal and team members must feel connected to one another having some type of team building activity that promotes interaction [4]. Newman said that team building promotes "an increased sense of unity and cohesiveness and enable the team to function together effectively" [5]. Research has shown that cohesion is linked to team performance [6][7][8] and is considered one of the most important small group variables [9] with cohesion-performance being driven by goal or task commitment [10].

Team building requires group goals to be defined and tasks identified [11]. As team members struggle to define roles and requirements for the project, the group needs open communication to build trust. As the team works towards a common objective, the members develop social relations. When team members demonstrate a level of respect for peers, the foundation is laid to begin having a successful team and the group functions as a unified unit [12][13].

Team cohesion has long been considered by military psychologists to be a significant factor in small-groups [14]. The military contends that cohesive groups are more effective in combat situations, thus providing an advantage over their opponents [15]. Laurel Oliver said "the military maintains that cohesive groups engender effectiveness in combat situations" [16]. Tziner and Vardi said "a non-cohesive unit could lead to fatalities in artillery and tank crews" [17].

Team unity can be accomplished through a variety of team building activities [18] that improve a group member's knowledge about effective communication, group problem solving and teamwork, self-esteem, and organizational commitment. A common team building activity is the use of outdoor management education (OME) [19]. OMEs involve a wilderness experience often using rope and challenge courses. However, OMEs can be costly and time consuming. This article explores the less expensive and time-consuming alternative of team building by playing collaborative video games.

Pros and Cons of Video Games

The U.S. military is recognizing the advantages of using video game simulation in combat training by creating a virtual environment that more closely mimics reality, with realistic threats and having the ability to represent human interaction [20]. Simulations are life-like video games [21] and are helping soldiers from all over the world sharpen their fighting skills and prepare them for the forth-coming battlefield mental stress [22]. They are also bridging the gap between classrooms and real job skills and improving the learning process [23]

In the military, researchers have shown that there is a correlation between cohesion, morale, and combat efficiency [24]. Military cohesion has been defined as "the bonding together of members of an organization/unit in such a way as to sustain their will and commitment to each other, their unit, and the mission" [25]. Frederick Manning defines morale as "a function of cohesion and esprit de corps," and says it is necessary in combat since unit members rely upon each other in order to survive and succeed [26].

Until recently, video game studies might have been considered laughable [27], but an increasing number of studies are being investigated to determine the pros and cons of playing video games. As seen in Table 1, video games are a popular form of entertainment, but they are also a powerful learning tool [28] and are shaping the way we learn. Prensky said "Ever since Pong arrived in 1974, our kids have been adjusting or programming their brains to the speed, interactivity, and other factors in computer and video games, much as their parents the boomers reprogrammed their brains to accommodate TV" [29].

Effect	Description
Cognitive Performance	Video game play can improve short-term working memory, visual attention, mathematical decision making, and auditory perception.
Cooperative Play	Participants must work together to win the game.
Entertainment	Enjoyment of play.
Socially Therapeutic	Playing video games can help players relax, vent frustration, distract pain and help learn.

Table 1. Positive effects of video games

Pediatrician Dr. Benjamin Spock expressed the opinion that "The best that can be said of them is that they may help promote eye-hand coordination in children. The worst that can be said is that they sanction, and even promote aggression and violent responses to conflict. But what can be said with much greater certainty is this: most computer games are a colossal waste of time" [30].

Effect	Description
Addiction	Players may become game dependent.
Aggressive Behavior	There are theories that playing violent video games may be tied to aggressive behavior.
Physical Health Risks	Some video games could cause seizures.
Social Health Risks	Players may become socially dependent upon game play and be socially isolated.

Table 2. Negative effects of video games

Some of the negative effects have been identified in Table 2.

However, in his book "Everything Bad is Good for You", Steven Johnson made the argument, "The most debased forms of mass diversion – video games and violent television dramas and juvenile sitcoms – turn out to be nutritional after all" [30]. In 2003, James Paul Gee, a noted psycholinguistics researcher, said that video games are inherently social and that they have the potential to lead to active and critical learning. He went on to say that the real potential of games is "to get people to think, value, and act in new ways" [31].

The popularity of video gaming not only is perceived as a popular form of entertainment but is being researched as a tool for improving organizational training results. All teams are different and therefore a myriad of instructional strategies should be researched and implemented [32]. As organizations struggle to compete in a global economy the development of intellectual capital has become their most valuable asset [33]. Developing capital such as organization's workers involves the use of training to unleash the potential of human expertise [34] and improving the adult workforce.

In December of 2010, the Defense Acquisition University (DAU), a corporate university for the Defense Acquisition Workforce, launched the Department of Defense casual games site. Dr. Alicia Sanchez, Game Czar for DAU, said that the rationale for the site was a place for employees to play games that were related to the core competencies central to Acquisition jobs [35].

Full Spectrum Warrior is a video game based upon a U.S. Army simulation requiring the player to think like a professional solider in order to survive [36]. Prensky said "the US Military uses more than 50 different video and computer games to teach everything from doctrine, to strategy and tactics" [37]. Games such as America's Army offers a virtual basic training to develop, train, and educate U.S. Army soldiers. In 2011, game designer and author Jane McGonigal said, "Those who deem them [video games] unworthy of their time and attention will not know how to leverage the power of games in their communities, in their businesses, in their own lives" [38]. Video games are here to stay, and one must harness the power of the game play for the benefit of society. This paper demonstrates that one benefit of collaborative video games is increased team cohesion.

Measuring Cohesion

In order to measure team cohesion, one must first understand the correlated cohesion constructs. The Group Environment Questionnaire (GEQ) was used in this study to assess the level of cohesion achieved within a group. Researchers Albert Carron and Lawrence Brawley created the GEQ based upon assumptions that cohesion can be evaluated through perceptions of individual group members. The test identifies four constructs related through different task and social interactions as viewed through the eyes of the individuals about themselves and their team. The authors clarify that the model is a framework that serves as a guideline and should be used in its original content. However, as necessary, revisions are acceptable, including changes to words, the deletion of non-pertinent questions, and the addition of items that are more culturally meaningful to the study.

The GEQ is an 18-item questionnaire based upon Carron's conceptual model of cohesion representing four constructs. The model divides cohesion into two categories: group integration and interpersonal attractions to the group. The model then subdivides the two categories into 4 sub-scales by assessing the Group Integration-Task (GI-T), Group Integration-Social (GI-S), Individual Attractions to the Group-Task (ATG-T), and the Individual Attractions to the Group-Social (ATG-S). The GI-T and GI-S sub-scales represent the "us", "our" and "we" perceptions while the ATG-T and ATG-S sub-scales represent the "I", "my", and "me" perceptions.

Four test questions refer to ATG-T, five questions assess ATG-S, five questions assess GI-T, and four questions assess GI-S. Responses are in the form of a 9-point Likert scale based on strongly disagree (1) and strongly agree (9) with the higher score reflecting stronger perceptions of cohesiveness. Some items on the questionnaire were slightly modified as suggested by the instrument authors to represent the culture of this study. Since team cohesion is a multidimensional construct, all four components of team cohesion do not need to be present in order to show a degree of change in cohesion.

The instrument is based upon three fundamental assumptions: 1) Cohesion can be evaluated through the perception of group members; 2) The group satisfies personal needs and objectives, and 3) A group's concern to the group and members by focusing on task and social factors helping to create unity. As shown in Figure 1, the GEQ model identified four correlated constructs representing the task and social orientations as perceived through the group member about his/herself and about the team.

The "GI" represents group integration and "ATG" represents "attraction to the group." The "S" represents the social relationships within the group and how an individual views the group as a social aspect. The "T" identifies the individual's perception towards achieving a specific goal or objective [39]. The GI-T and GI-S represent the "us", "our", and "we" individual perceptions of the group such as the closeness, similarity and bonding. The ATG-T and ATG-S represent the "I", "my", and "me" individual perceptions of self and the motives to remain in the group.
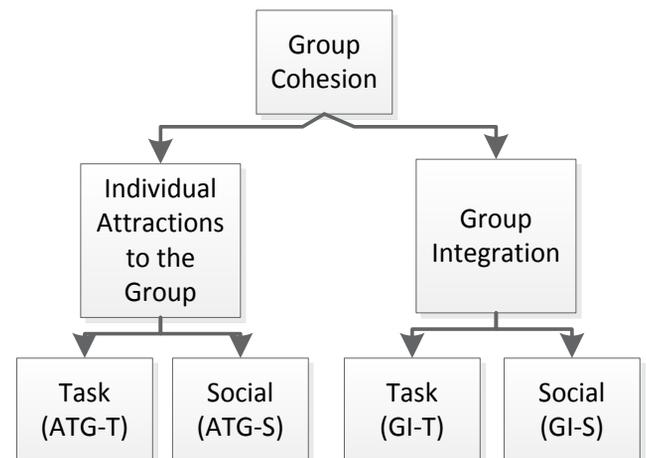

Figure 1. Factors defining cohesion

Although OMEs have been used in the past to increase team cohesion, this research shows that playing collaborative video games can also increase the cohesive sub-scale factors ATG-T, ATG-S, GI-T, and GI-S, thus resulting in a higher level of team cohesion.

Research and Methodology

This study introduces the use of cooperative video games as a tool to mimic the OME environment. The participant is removed from the worries of society by being immersed into video game world. The goal of the video game player is to work with team members to win the video game. The risk involved, when losing, is a state of emotional discouragement for having not succeeded. By using a cooperative video game, a single participant cannot win the game for the team. All members must cooperate, communicate, problem solve, and be committed to the team in order to have a chance at winning. When members do well, their self-esteem is buoyed.

With the environment resembling the OME, this study implemented a quantitative approach using a pretest/posttest design. Teams were randomly formed and assigned a length of intervention of either one or three weeks of game play with the intervention length ranging from one hour to six hours to play a collaborative video game. Like other forms of entertainment, video games were classified into genres. Although not completely standardized, a commonality has been identified from which new video game developers must consider while designing a game to be released [40] the genres (see Table 3) identify the style of game play [41].

The collaborative video game selected for this research was Halo 3. It was designed by Microsoft's Bungie Game Studio and has an ESRB rating of mature for blood and gore, violence and mild language. Halo 3 is an action game genre and is a first person shooter. One to four players participate on one of four teams thus creating a cooperative environment where team members must defend and protect each other against the enemy. If desired, four teams of four players can participate at one time playing against the other teams. Each team uses an Xbox 360 console networked to other consoles and competes against other teams for a specified number of rounds. A round is identified as the number of enemies killed. Players return to Earth to save mankind from the Covenant, an evil alien force. The multiplayer mode should be "slayer" which allows up to four teams of four players each to "rack up" a certain number of kills. The number of kills for each round should be at least twenty-five. The win/loss records were not kept. The teams selected for this study were similar in context and played as many rounds as possible within the one to two hour block time. Game play continued until the team's randomly assigned intervention schedule was completed.

Table 4 summarizes the descriptive statistics of the demographic and covariate variables tested in the analysis.

The 18-item GEQ was administered as a pretest to assess the participant's perceptions of group integration and interpersonal attractions to the group. The model is subdivided into two categories (Table 4) assessing the Group Integration-Task (GI-T), Group Integration-Social (GI-S), Individual Attractions to the Group-Task (ATG-T), and the Individual Attractions to the Group-Social (ATG-S). The participant responses are in the form of a 9-point Likert

Genre	Description
Action	Involves fast action and good hand-eye coordination.
Adventure	Exploration.
Arcade	Mimics early arcade games.
Combat	Fighting.
Driving	Simulated driving and racing.
First-Person Shooter (FPS)	Action genre from a first person perspective.
Multiplayer	Supports more than one game player simultaneously.
Puzzle	Solving problems, mazes, and puzzles.
Role Playing Game (RPG)	Storyline stressed over action.
Simulation	Mimics reality.
Sports	Traditional sports.
Strategy	Planning and resource management.
Third-Person Shooter (TPS)	Action genre from a perspective above and/or behind the player.
Trivia	Intellectual testing knowledge.

Table 3. Video Game Genres

Variable	Statistic
Age	>= 18 and <= 29 (n=56)
Gender	Female = 13% and Male = 87%
Group 1 Subjects	(n=29) 25 Male; 4 Female
Group 1 Average hours/week playing video games	10 hours
Group 2 Subjects	(n=27) 24 Male; 3 Female
Group 2 Average hours/week playing video games	16.11 hours

Table 4. Descriptive statistics

Sub-Scale	Description
Interpersonal Attraction to the Group ATG-T (task)	Individual's feelings about personal involvement in the group's task, productivity, goals, and objectives.
Interpersonal Attraction to the Group ATG-S (social)	Individual's feelings about personal acceptance and social interactions within the group.
Group Integration GI-T (task)	Individual's feelings about the closeness, similarity, and bonding within the team based upon group's task (playing Halo).
Group Integration GI-S (social)	Individual's feelings about the closeness, similarity, and bonding within the team based upon the group's social unit.

Table 5. Cohesive sub-scales

scale based on strongly disagree (1) and strongly agree (9) with the higher score reflecting stronger perceptions of cohesiveness.

The one-week study consisted of one hour of cooperative game play for that day. The three-week study consisted of two hours of cooperative game play each week for three weeks, totaling six hours of intervention. At completion of the study a posttest was administered using the modified GEQ survey.

Results

The results of this study confirmed that playing collaborative video games increased team cohesion in every GEQ cohesive factor. Whether the groups played one hour or six hours, there was still an increase in team cohesion. This implies that playing collaborative video games as a group could potentially be a less costly and time consuming team building activity for a positive change in cohesion in an environment where teams are used.

H1: There was a difference in the team cohesion factor ATG-T based upon the intervention.	Supported
H2: There was a difference in the team cohesion factor ATG-S based upon the intervention.	Supported
H3: There was a difference in the team cohesion factor GI-T based upon the intervention.	Supported
H4: There was a difference in the team cohesion factor GI-S based upon the intervention.	Supported

Table 6. Summary of Hypotheses and Results

The results demonstrated support for the hypotheses in that cohesion was positively affected by playing collaborative video games (See Table 6).

The six hours of video game play did produce slightly higher cohesion (see Table 7) but the increase was marginal. The ATG-T and ATG-S, which measured the individual attraction to the task and social aspect, had slight increases in the gain score percentages. But one must consider whether or not the amount of game play to achieve that gain justified the intervention time.

Group 1 – One Hour of Video Game Play Intervention

	ATG-T		ATG-S		GI-T		GI-S	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Pretest	6.62	1.30	4.86	1.04	5.48	0.90	5.00	0.86
Posttest	7.53	1.42	5.85	1.04	6.57	0.94	5.60	1.32
Positive Gain	0.91	38%	0.99	24%	1.09	31%	0.60	15%

Group 2 – Six Hours of Video Game Play Intervention

	ATG-T		ATG-S		GI-T		GI-S	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Pretest	6.19	1.15	4.88	1.29	5.10	0.59	5.19	0.76
Posttest	7.38	1.45	5.98	1.36	6.30	0.91	5.63	1.03
Positive Gain	1.19	42%	1.10	27%	1.20	31%	0.44	12%

Table 7. Group 1 & 2 Pretest and Posttest Means and Gain Scores.

The one hour of video game actually received the same level of increase for the GI-T cohesive factor and scored a greater increase on the GI-S, meaning that if the ultimate goal was to increase the group member's perception of closeness, similarity, and bonding with the group, then only one hour of game play needs to be implemented to achieve the organization's goal.

Conclusion

Today's global economy requires that organizations constantly seek for ways to improve and to surpass their competition. A variety of strategies could be implemented to improve different aspects of the organization. If team cohesion could be strengthened, the result will likely be improved team performance. Organizations continue to search for mechanisms to improve teamwork by finding and implementing new methods for effectively accomplishing a task and increasing social capacities for individuals to handle problems. Strategies for improvement include making a team more cohesive so that the members are more committed, thus increasing productivity and performance.

In the military, unit cohesion is essential for a strong military force. In fact, it means more than being liked by others; it is a willingness to die for someone else. As there is a correlation between cohesion, morale, and combat efficiency, playing collaborative video games can increase team cohesion. This can result in military units

improving morale and combat efficiency, and potentially increasing the rate of soldier survival and operation success.

Whether the organization is striving to improve performance or to improve soldier survival and operational success, this study concludes that it can be beneficial to have teams play collaborative video games even for as little as one hour to increase team cohesion. However, this is just scratching the "tip of the iceberg." Further studies are in the process that measure team cohesion after video gaming and after other endeavors to see whether the team cohesion obtained in video gaming actually transfers to the follow-on endeavor. ◈

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