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Teaching Tip

A Memory Game to Demonstrate the Power of Collaborative Efforts to Improve Team Performance

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ABSTRACT

Collaboration is an important aspect of information systems (IS) education since work is typically performed in teams. However, IS students often do not fully appreciate the value of group work in their business courses. This teaching tip describes an activity that will objectively demonstrate the value of collaboration and diversity of perspectives, while simultaneously satisfying the preferences of visual and experiential learning styles. Knowledge gained through collaborative and cooperative learning tends to be retained for an extended period of time. The author includes discussion prompts to help guide students as they identify the value of diverse perspectives in team settings, but instructors are encouraged to follow the interests of their students and allow rich discussion to emerge naturally.

Keywords: Diversity, Collaboration, Learning styles, Interpersonal skills, Team-building skills

1. INTRODUCTION

In industry, most information systems (IS) professionals work in teams to implement solutions to business projects (Bernbom, Lippincott, and Eaton, 1999; Cole, 2011; Glen, 2003; Neufeld and Haggerty, 2001), and a number of collaboration technologies exist to enhance those working relationships (Jung, Schneider, and Valacich, 2010; Karsten, 1999). To prepare students in the IS discipline, many business courses include group projects as an important component of the curriculum (e.g., Dunphy and Whisenand, 2006; Lending, 2010). Some students complain about group projects, noting realistic challenges such as “freeloading” (i.e. non-contributing) team members, scheduling issues, and personality conflicts. There is also a tradeoff for the instructor between reducing the sheer number of assignments to grade and the added stress of moderating the conflicts that inevitably surface. So, why don’t we simply eliminate group projects from our curriculum? It would solve many problems. And, students don’t seem to value this experiential education we are exposing them to in the classroom. That is not an acceptable response; elimination of team projects perpetuates the complaints of potential employers that new hires lack interpersonal and team skills (Neufeld and Haggerty, 2001). Incorporating diverse perspectives in problem solving activities, and coping with group conflict are necessary skills that are developed through experience (Kroenke, 2012).

Lending and Vician (2012) provided clear and concise guidelines for developing Teaching Tips. This paper has attempted to include the elements posed, providing a useful exercise intended to increase awareness of interpersonal skills developed through collaboration activities along with creating an appreciation for diverse perspectives among peers. As identified in the guidelines, this Teaching Tip relates the exercise back to theoretical foundations of learning styles and collaborative learning techniques. The exercise description contained herein permits instructors to replicate the process, and includes a number of suggested alternatives for adapting the procedures. Results from past experiences are also explained, showing that the activity has been used several times with varying class sizes and has been “tested in the field” (Lending and Vician, 2012: 15). This paper also incorporates the modifications that the instructor has adopted through evolutionary improvements over the years. Teaching Tips must provide valuable instruction to address learning objectives and provide evidence of improvement from actual observations. The most significant contribution of this Teaching Tip is its innovative solution to important aspects of business professional education, the value of collaboration and diversity.

The purpose of this activity is to demonstrate, in an interesting and enjoyable way, the benefits of collaboration and teamwork. Students tend to retain the valuable lessons learned long after experiencing this lively game in class. The

following activity is also easy to implement in any course setting.

1.1 Background

This activity has been administered multiple times to undergraduate students enrolled in the IS/IT Management course at a small, Midwestern university. It is a required course for all business majors, and is usually scheduled in the second or third year of matriculation. The class size averages 25-35 students, and is capped at 45 per section. Two sections are offered each semester, and another section during the summer term if demand is sufficient. Since the instructor of record rotates between the MIS faculty, this activity is not included every time the course is taught. The composition of the class is primarily contemporary, traditional-aged students, and nearly equally balanced among males and females. There are generally 10-15% international students and about the same percentage of non-business majors (e.g. engineering disciplines, technology, mathematics, and computer science). Both level of interest in technology and computing efficacy reflect a broad distribution. Only about 30% of the students self-identify as “experts” with regard to computer usage and technology manipulation. In project teams, that can be both beneficial and basis for conflict. As noted in the literature, conflict resolution is a time-consuming managerial activity (e.g. Hignite, Margavio, and Chin, 2002). Due to the diverse makeup of the class (i.e. academic majors, technical affinity, interpersonal communication skills, and cultural backgrounds), project teams often struggle during the process of forming cohesive and productive groups (Tuckman, 1965). The development of trust and rapport takes more time in teams characterized by heterogeneous composition (e.g. Lim and Zhong, 2006). Taking deliberate action early on to increase mutual acceptance of team members can produce meaningful dividends during the semester.

The business school is accredited by the Association to Advance the Collegiate Schools of Business (AACSB), recognizing quality management education and standardized procedures for documenting academic performance. One of the shared values listed on the organization’s website is “embracing diversity in advancing quality management education worldwide” (AACSB, 2012). This objective is interpreted and applied to the curriculum in numerous ways. For this IS/IT Management course, diversity is introduced by encouraging the integration of a variety of individual perspectives in problem solving activities in order to broaden identification of root causes and to create the most effective solutions possible given the underlying constraints. The activity discussed in this Teaching Tip helps students appreciate that diverse perspectives and personal abilities (i.e. memory skills and recall) are valuable in completing a challenging task. When this exercise is performed at the beginning of the semester, the instructor has experienced notably fewer dysfunctional team results. Additionally, mid-semester feedback from students and end-of-semester course evaluations have included specific mention of this activity as both enjoyable and highly educational. The students universally expressed positive opinions regarding the inclusion of this exercise in future administrations of the

course. Gaining a deeper appreciation of diversity and the potential value of shared views appears to increase understanding and peer-to-peer patience, as well as decrease occurrences of “non-contributing” behaviors (e.g. freeloading).

In addition, AACSB (2012: 55) requires teaching faculty to “encourage collaboration and cooperation among participants”. Faculty members are instructed to provide both formal and informal opportunities for students to develop effective group skills, including collaborative learning, as well as to visibly model appropriate collaborative behavior through personal interactions outside of the classroom. This Teaching Tip contributes to that important learning component.

1.2 Collaborative Learning

Collaborative learning is defined as the process of two or more individuals creating, sharing, and evaluating information in order to create and disseminate knowledge among the participants (e.g. Fitzpatrick and Ali, 2011; Lim and Zhong, 2006). Neufeld and Haggerty identify collaborative learning as “one variant of constructivism that focuses on group interactions” and is often operationalized through socially combinatorial group instruction, such as team projects (2001: 37). By incorporating intentional collaborative exchanges in classroom instruction, students begin to acquire interpersonal communication skills and learn to contribute voluntarily to shared team goals (e.g. Fitzpatrick and Ali, 2011).

1.3 Learning Styles

Educators are generally aware that students have different, innate learning styles that influence their information processing. Presenting course content in various ways helps to engage the majority of students, addressing their personal educational needs (Cegielski, Hazen, and Rainer, 2011). Alfonseca and his associates (2006: 381) define learning style as “characteristic strengths and preferences in the ways people take in and process information (Felder, 1996)”. Their evidence shows that learning by seeing and doing is often a preferred method, thereby contributing to the emphasis on experiential learning in higher education (Kolb, 1984). In-class activities, such as the one described in this Teaching Tip, satisfy several important elements of learning in a format that exhibits higher retention (Cegielski, Hazen, and Rainer, 2011). The students must actively engage in the activity; there is an element of competition involved, with “winning” as an incentive; and, the results are immediate and relevant to multiple real world settings.

2. ACTIVITY INSTRUCTIONS

This activity can be completed in a 50-minute class period, but time for rich discussion will probably be limited. The discussion can also be postponed to the following class session, if necessary. In preparation, the instructor needs to make enough copies of the handouts (Appendix A and B) for each student, and gather a variety of small, portable items. A possible list is provided in Appendix B, but the instructor should update Appendix B with descriptions of the actual items used. The items could include rubber bands, binder

clips, candy, scissors, cellular phone, and children's toys. When selecting items, the more colorful and silly, the better. Ideally, the assortment of items will be functionally varied, represent an assortment of colors and shapes, and consist of varying sizes (large and small by comparison). These differences will be useful in the alternative exercises involving classifying objects. The instructor will also need a deck of playing cards and access to a timer or clock with a second hand.

On the day of the activity, assemble the items on a table (or on the floor) and cover everything with a blanket or coat. Do not allow the students to view the objects before the activity begins. Setting up the activity early will help to build anticipation among the students. The instructor should maintain an air of mystery in order to engage their interest.

Sort a deck of playing cards, extracting just enough cards so that each student will receive one card. Make sure the cards to be distributed contain all four suits of the numbers/face cards. Have the students retain their cards through the first two rounds of the game, and then collect the cards at the conclusion of the activity. Ideally, the number of students will be a multiple of four, so that each team in Round 3 will have exactly four members. However, realistically, one team often ends up with less than four members, and those students will be at a disadvantage in the final round. Instructors can use that situation as part of the discussion, and bring "consolation" prizes for those students. Distribute playing cards and copies of the worksheet (Appendix A).

Before beginning the activity, have the students write their names (optional, for attendance purposes) and playing cards on the worksheet (Appendix A). Instruct the students to leave their playing card and worksheet on the desk and gather around the concealed items. Ensure that every person is able to observe the items from the different locations. If necessary, entice recalcitrant students by promising a prize or incentive (e.g., extra credit points) for the winner. Tell the students they will have 2 minutes to view the items in front of them, memorizing as many objects as possible. They are not to write down anything during this step. Remove the covering and start the timer. At the end of 2 minutes, replace the cover and direct the students to return to their seats.

Rules: No talking and no touching of items on the table. It is helpful to remind students that this is a "friendly competition". Any talking will probably help their opponents by drawing attention to items they might have missed. The same is true of touching the items on the table (or floor). Ensure that every item is in clear view before beginning the exercise, so there is no reason for the students to feel the need to move the items. It helps to give a countdown, to warn students that time is expiring and to add to the excitement of the "sport".

Round One - Individuals

Tell the students they will have 2 minutes to write down as many objects as they can recall. They also need to place an "X" on the worksheet in the general location where they were standing while viewing the items. (Instructions are covered in Step #2 of Appendix A.) Instruct them to begin writing and re-start the timer. At the end of 2 minutes, tell everyone to stop writing and to count the number of items on their lists. One modification that was added based on

personal experience is to distribute copies of the items (Appendix B) after they have written their lists, and have the students make an "X" over each item they recalled. No new items are to be added when marking the grid sheet. As covered later in this Teaching Tip, the grid sheet method also helps international students identify items for which they lack the English word in their language skills base.

Poll the class to identify the highest score (n_1) for Round One. Award a prize to that person (optional) and write the score on the board as "Individual = n_1 ".

Round Two - Pairs

Next, have each student locate the person who has the same playing card value (number/face card) and the same color of suit (red or black). For example, the two students with black "tens" (clubs and spades) would complete a pair. This part of the activity might take a few minutes, and will seem like mild chaos as students locate their partners. Some pairs might even require assistance in finding their teammates.

These pairs should now compare their lists, counting duplicates only once. (Alternately, simply total the two lists and do not worry about eliminating duplicates.) The grid sheets (Appendix B) completed in Round One will help this comparison step go more quickly and smoothly.

Determine the pair with the highest number of items (n_2). Award prizes to the winning pair (optional) and write the pair's score on the board as "Pair = n_2 ".

Round Three - Teams

Finally, have the students locate the pair that matches their number/face value to complete their team (e.g., all four Aces). These teams now compare their lists as in Round Two, counting duplicates only once (or ignoring duplicates).

Determine the team with the highest number of items (n_3). Award prizes to the winning team members (optional) and write the final score on the board as "Team = n_3 ".

3. DISCUSSION OF OUTCOMES

Once the final results have been tallied and posted, the instructor should facilitate the group discussion (or allow discussion in small groups). Begin the discussion by focusing on how the exercise demonstrates the value of collaboration and teamwork, and steer the conversation toward a greater understanding of collaborative techniques. This ties the exercise back to describing the collaborative learning environment that is the format for the semester project. Some teams benefitted, or were hindered, by characteristics of the members. The first item that emerges in discussion is usually the importance of having the winner of Round One in the final team. This is referred to as the "Hero" or "Guru" below. The second relevant consideration is the physical position of the team members around the items. Ideally, the team should include individuals who had opposing views of the item layout. At this point, the instructor should define the characteristic as "diverse perspectives". At some point, students will offer that people possess different abilities. Therefore, some students will just naturally have a greater affinity for rote memory than others. It is important for teams to have the special skills required to successfully complete the shared goals. This directly relates to the value of collaborative learning and the advantages of

having teams that include students with different perspectives. To wrap up the exercise, encourage students to recognize that it isn't always better to keep adding more individuals to the team. At some point, the challenges of communication and coordination outweigh the benefits of including more team members. This is referred to as the "law of diminishing returns". The following sub-sections include discussion prompts and more details about the general themes that have emerged in the implementation of this activity over the past several years.

3.1 Heroes and Gurus

How does winning the first round affect outcomes in later rounds? This question causes the class to consider the value of a "guru", someone who has special skills related to the task (Nelson, Buche, and Ghods, 2000). The class might also discuss the risk of relying on a single individual to "carry the team". However, the "guru" is not always part of the winning pair or team in later rounds, although he/she does tend to have a slight advantage. In other words, there is undeniable value in hiring knowledgeable, skilled employees. The team is at a competitive advantage if it has the top individual scorer. But, that isn't a guarantee for success in the later rounds. Historical results: The average for *individual* scores over the 15 administrations since fall 2004 was 23.07 items recalled. For *pairs*, the average was 31.4, showing an increase of 8.33 from the first to the second rounds. *Team* average was 39.93 items, increasing by 8.53 over the paired scores. Only one team has managed to recall 48 of 50 items.

3.2 Location, Location, Location

How does physical location affect scores? Another topic that emerges is what might be called "Diversity of Perspective". Essentially, the person's location around the table will influence, to some extent, the eventual list that is created from memory. And, the pair benefits if the two individuals were standing at opposite ends of the table when viewing the items. This allows the partners to concentrate on different items based on physical proximity, producing fewer duplicates in their combined list. The discussion often turns to valuing diversity in organizations, whether it is defined as gender, minority status, or any other distinguishing characteristic. Students begin to appreciate that visualizing the same problem or scenario from different physical or mental viewpoints can be helpful in solving problems and developing solutions.

3.3 Natural Abilities

How do personal skills and abilities affect scores? Some students complain that they were at a disadvantage because of poor memory skills. This observation can be used to discuss the fact that employees in organizations exhibit a variety of abilities – some people simply have better memories than others. Some people are superior at organizational skills, interpersonal communication, or problem solving. A strong team can survive even when it contains weak members, provided that the team works together towards a successful outcome. However, the class should consider what would happen to the team if it relied on a single individual for overall success. That simulates the

real-world situation when a key employee leaves the organization for another opportunity. Usually, the winning team would not maintain its ranking if it lost its highest performing member. The author uses this topic to discuss knowledge management and methods of systematically retaining expertise.

3.4 Law of Diminishing Returns

Will scores continue to increase as more people are added to the team? By listing the scores on the board, the students should immediately recognize that the number of items tallied increases with the addition of team members. It is easy to emphasize this progression by including the differential values between each round of "play" (e.g. +7). Unfortunately, as with most management and behavioral activities, the scores do not always follow this pattern. If that is the case, the instructor can explain this anomaly so that students still recognize the anticipated value of adding members to a team.

This discussion provides the opportunity to cover two interesting constraints: the performance cap and the concept of an optimal group size. The students are usually very quick to recognize that the highest score must not exceed 50, regardless of how many additional members are added to the team. This segues easily into a discussion of "optimal" group size. With little encouragement, students realize that group coordination, scheduling conflicts, and effective communication all detract from team productivity when the number of participants becomes too large. The actual value of "too large" will vary, depending on the project and other relevant variables. For example, Google, Inc. keeps teams small in order to promote agility and innovation (Girard, 2009). Geographic distance (e.g. virtual teams) and electronic communications (e.g. teleconferencing) should come up in that conversation as management considerations.

3.5 Multi-Generational Project Teams

A fascinating twist in the business environment is the current phenomenon of multiple generations working together on project teams. For example, McNichols (2010) provides an enlightening perspective on the transference of knowledge from Baby Boomers to Generation X aerospace engineers. This discussion is a natural extension to the present Teaching Tip, reminding participants that everyone has a role to play and potentially valuable information to share. Creating a learning organization requires the contributions of a heterogeneous amalgamation of individuals.

4. MODIFICATIONS AND SUGGESTIONS

If time permits, there are a number of variations that could be added following the discussion on collaboration and the value of diverse perspectives. Instructors can make simple changes to use this activity to supplement many different topics that are routinely covered in IS courses. One variation on this activity is to use the list of items to demonstrate categorization and pattern recognition, a fundamental topic in computing education. Instruct the teams to list numerous ways they could systematically divide up the items based on self-identified criteria. Students should strive to think creatively and brainstorm without censoring responses from

team members. One student from each team might be the designated recorder and share the results with the class. The students will likely begin with obvious classification schemes, such as size and color. With more effort, they might include characteristics such as shape and texture. Eventually, the teams should begin to classify items by purpose or function, such as toys to play with, tools to write with, or candy and edible items.

As another follow-on activity, the item list can be used to create a simple database. However, database design is often considered to be an advanced IS topic, not usually covered in introductory IS courses. The teams would need to decide what attributes (fields) are important and should be stored in the tables. The database should conform to normalization standards, decreasing the effort required to maintain the database over time.

Additional variations to this activity might involve conducting a pretest or survey to collect individual information such as grade point average (GPA), gender, memory aids used, or even student height (anticipating that this physical characteristic could give the student a natural advantage over peers). These factors, many outside of the student's control, might also lead to interesting discussions about various contributions to "winning" the game.

5. SPECIAL CONSIDERATIONS

Over the years, some special situations have occurred that require intervention by the instructor. First, scores sometimes result in a tie. The instructor should decide, in advance, how to deal with tie scores. Suggested solutions are to either draw a card from the deck of playing cards (e.g. high card wins) to break the tie, or reward more than one person/group without attempting to break the tie. It is important to maintain a playful atmosphere, so be mindful of introducing unnecessary tension over the outcomes. Some students are naturally more competitive than others, and they might need to be reminded that the process of the exercise is more important than the prizes.

Another situation is the inclusion of international students, particularly students who experience English as a Second Language (ESL). International students should be allowed to use their electronic language translators to help them with the list of items. Unfortunately, the author has not observed an international student emerge as the winner of the first round, as a "guru". However, providing the grid sheet (Appendix B) following Round One has noticeably improved their engagement and enthusiasm for the exercise. Also, the playing card method of randomly establishing teams eliminates any opportunity to exclude students based on personal bias or stereotypes. To include all students, it is important to avoid using items that are culturally biased, if possible.

Finally, this game can be used in other academic disciplines with equal success. Based on personal experience, however, it is not recommended for use with very large groups. A workable solution might be to have a sample of the class participate in the three rounds as described above, and subsequently the entire class would be invited to join in the discussion.

6. CONCLUSIONS

Students in business schools are often subjected to team assignments, but instructors provide little explanation to convince them of the benefit of working in groups. What they typically experience is frustration with individual schedule mismatches, personality conflicts, and "freeloaders" who do not contribute to the goals of the team. Lectures preaching the wondrous benefits of collaboration often fall on deaf ears. Instructors are more effective if they demonstrate those benefits through an activity with objective, discernible outcomes. This Teaching Tip offers a number of discussion prompts for instructors to use to guide the learning experience and impress upon students the value of diverse perspectives in collaborative engagements. What is even more interesting is to see where the students take their own discussions. The unanticipated learning that organically emerges will reveal their thought processes and provide greater opportunities to share individual perspectives.

The "lessons learned" from this exercise seem to have a lasting effect on students. Years later, some graduates have mentioned that it was one lesson that made a big impression on them. The concepts were easy to comprehend, and the implications extended beyond the classroom environment, even into their work settings post-graduation. The following quotes, extracted from anonymous end of the semester teaching evaluations, are representative of student feedback:

My favorite activity this semester was the memory game. I never really thought about diversity being important to my project team in school.

Most people talk about diversity meaning minority, gender or ethnicity. I like that we learned that diversity is really about perspective. The game taught me that.

Keep doing the memory game. I learn more when I can see the results.

In spite of the contrived nature of this activity, the underlying themes added value and enhanced experiential learning. Combining the elements of fun and competition lengthens the recall of the potential benefits of diverse perspectives in teamwork settings (Kolb, 1984). Problem solving and brainstorming outcomes are enhanced by the variety of unique viewpoints encompassed in the action of identifying the problem, offering alternatives, limiting the list to feasible solutions, and developing the final response. A student expressed this concept best:

I remember feeling like, "I'm really good at this game, and my team listened to me because I helped us win a prize." That's the first time I ever felt like my opinion mattered. I like knowing that I add value to my team when I share my ideas. I contributed more this semester (on the team project) than I ever have before. I'm usually the 'quiet one' on a team.

In particular, creating partnerships between IS and business professionals, with their unique perspectives, can lead to greater effectiveness (Bassellier and Benbasat, 2004). In order to appeal to students with various learning styles and preferences, instructors should incorporate engaging, experiential activities that demonstrate key learning concepts. Based on the outcomes of this exercise, students developed a deeper appreciation for the value of collaboration on improving team performance.

6. ACKNOWLEDGEMENTS

I would like to thank the hundreds of students who, over the years, have participated in this activity. Their enthusiastic responses have encouraged me to continue to use this exercise to emphasize the critical role of diversity in teams and organizations.

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**APPENDIX A
Worksheet**

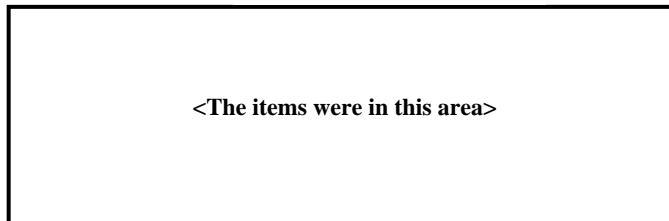
Card _____ ♥ ♦ ♠ ♣

Name (Optional) _____

MEMORY/COLLABORATION ACTIVITY

1. Fill in your playing card number and circle the suit in the space above.
2. Identify your approximate location during the viewing portion of the activity by marking an “X” on the following diagram showing where you were standing/sitting:

Front of Classroom



3. List as many of the items as you can remember in the time allowed. If you don't know what the item is called, provide a brief description. (International students may use your native language for this part.)

Individual Total _____

Alternatives:

4. On the back, list as many categories for grouping the items as you can think of.
5. How does this activity apply to team work in organizations? (Answer on back)

APPENDIX B

List of items (Example):

QUARTER	RUBBER BAND	DIE	MINI POST-IT NOTE PAD	YELLOW HIGHLIGHTER
BUSINESS CARD	SMALL SCREWDRIVER	6-INCH RULER	NAIL FILE	LARGE PAPER CLIP
LARGE BINDER CLIP	SCISSORS	PLASTIC FORK	AAA BATTERY	FLOPPY DISKETTE
PAINTBRUSH	PENCIL	TEABAG	PIECE OF CANDY	TIN OF MINTS
KEYS	STAPLE REMOVER	POCKET PACK OF TISSUES	CD IN A CASE	RUBBER DOOR STOP
NAIL POLISH	CALCULATOR	ROLL OF MASKING TAPE	PACKET OF KETCHUP	SPOOL OF THREAD
WHITE- BOARD ERASER	CANDLE	BELL	SMALL PENGUIN TOY	SUNGLASSES
HOLE PUNCH	PACKET OF CRUSHED RED PEPPER	CLOTHESPIN	USB THUMB DRIVE	GREEN MARKER
STAPLER	MINI-FLASHLIGHT	PENCIL SHARPENER	SMALL MATCH- BOOK	PACKET OF SUGAR
PACK OF CRACKERS	GLUE STICK	RED SILK ROSE	HAND SANITIZER	CHAPSTICK

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