

# Results of an experiment comparing the Analysis of Chick-fil-A Case Study by virtual teams versus face-to-face teams

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## Abstract

This paper outlines and presents the findings of an experiment that was performed using virtual teams. Two classes – one at Louisiana State University and one at Auburn University – were divided up into face-to-face teams and virtual teams. The virtual teams had members from both schools, and the members used information technology to prepare a

write-up and a presentation by analyzing the Chick-Fil-A case study. The authors spent a class period teaching students how to use a virtual meeting tool, Microsoft® NetMeeting. The goals of the experiment included comparing virtual team performance with face-to-face teams, the time spent on the project by both types of teams, team members’ understanding of the purpose and mission, and team members sat-

isfaction with their experience. The results indicate that face-to-face teams were more successful in all areas. The paper provides recommendations on how to run virtual teams in the future. Additionally, the paper explains what a virtual team is and provides examples of virtual teams, the effectiveness of virtual teams, and the criteria to measure success of teamworking.

## 1. Introduction

### 1.1. Goals of the experiment

Virtual teams that include members from different cities and countries have become commonplace in the business world in solving problems and coming up with innovative designs. With the use of virtual teams on the rise, many questions arise about the effectiveness of virtual teams. The questions appear in Table 1 below.

An experiment was run concurrently in a senior level course at Auburn University and Louisiana State University in order to answer the above questions. This paper describes the experiment used to

answer the above questions and the results from the experiment.

### 1.2. Definitions of the experiment

The following definitions apply to the information presented in this paper:

- **Virtual team:** A virtual team is a “group of people organized to collaborate with each other towards a common goal while located at two or more work sites distant from one another” (“Virtual Teams,” 2001). The virtual teams in this experiment were composed of Louisiana State University and Auburn University students working together on the Chick-Fil-A case study using technologies such as

telephone, chat, instant message, and email to communicate.

- **Face-to-face team:** A face-to-face team is a group of people organized to collaborate with each other towards a common goal while meeting in the same location. The face-to-face teams in this experiment were composed of either LSU or Auburn students working together on the Chick-Fil-A case study using mostly face-to-face meetings to communicate.

## 2. Literature review

### 2.1 Examples of Virtual Teams in Industry

Many large companies are using virtual teams, including Shell Oil, Sun Microsystems, and Motorola. NCR successfully used virtual teams to turn the company around. Using videoconferences, team members from different continents met to virtually design and complete NCR’s computer system in less than eleven months (Lipnack, 1999).

A great example of a project that used virtual teams is Boeing’s 777.

At the start of its 777 project, Boeing brought members of the design team from dozens of countries to Everett, WA, providing them with opportunities to work together. From a practical point of view, for a period of 18

**Table 1. Goals of the Experiment**

Do virtual teams perform better or worse than face-to-face teams?
Do members of virtual teams spend more or less time than members of face-to-face teams?
Do members of virtual teams have a harder or easier time getting connected to team members?
Do members of virtual teams understand the mission and purpose of the project better or worse than face-to-face team members?
Are virtual team members more or less satisfied with their experience than face-to-face team members?

months, they learned how to function within the company's project management system. The shared experiences also developed a level of trust between team members that later enabled them to overcome the obstacles inevitably raised by their separation. Linked by a network of 1,700 workstations that spanned more than a dozen countries, the 777 was launched in 5 years -30 to 40 percent faster than comparable paper-based designs. The plane also boasted 33 percent greater fuel efficiency than the 747, and cost 25 percent less (Kezsbom, 2000).

Without information technology, the development of the 777 probably would not have been as successful. One indication of how much the team members depended on information technology is that approximately one and a half billion bytes of data were transmitted on the network (Snyder et al, 1998).

Another industry that takes advantage of virtual teams is medicine. Telemedicine is the "use of information technology and telecommunications to deliver health-care services, with an emphasis on reaching medically underserved communities" (Anderson, 2000). Some examples of telemedicine are putting cameras in ambulances, emergency rooms, and examining rooms so doctors can view procedures away from the scene. In Louisiana, where the accident mortality rate is 1.5 times greater in rural areas, city doctors advise rural doctors using CAT scans, x-rays, and more. "Rural doctors are often short-staffed, are not as familiar with some symptoms and lack sophisticated technology to quickly diagnose certain illnesses" ("Grants," 1998). A network has also been created for rural healthcare providers ("\$500,000," 1999). Telehealth units are used to monitor patients from another location. Although nurses still visit the patients periodically, the telehealth units provide more frequent check-ups, decreased visits to hospitals and emergency rooms, decreased travel time, and decreased costs for the visits (Anderson, 2000).

## 2.2 Examples of Distance Education

Industry is not the only area using virtual teams for project benefits. During 2001, over one million students are en-

rolled in college-level classes virtually. The classes use many of the same techniques as industries to provide what is known as "distance learning." Distance learning is growing at such a rapid rate that over two million people are expected to take classes virtually by 2002, and 87% of colleges and universities are anticipated to have some form of distance learning by 2004. The majority of the classes offered are business and computer technology classes, and nearly two-thirds of all classes are at the undergraduate level. Although many classes are offered, only thirteen institutions offer degree programs. Perhaps the most famous and widespread of these is the University of Phoenix Online. With over 16,000 students enrolled and 2,000 degrees awarded to date, Phoenix is the pioneer in distance learning ("University," 2001).

## 2.3 Effectiveness of Virtual Teams

Wayne Cascio summarizes the advantages of virtual teams in his article that appeared in *The Academy of Management Executive*. He outlines six advantages to virtual teams and cites examples for each (Cascio 2000).

- *Increased productivity* -IBM gained 15 to 40 percent, while US West gained as much as 40 percent in productivity.
- *Reduced real estate costs* -IBM eliminated offices that are not needed and this saved 40 to 60 percent per work site.
- *Higher profits for the company* -Hewlett-Packard moved all salespeople to virtual workplaces and thus doubled revenue.
- *Better customer service* -Employees with Anderson Consulting that had virtual workplaces spent 25 percent more time in person with customers.
- *Improved access to global markets* -John Brown Engineers and Constructors used virtual teams and thus was able to work globally with clients.
- *Environmental benefits* -At Georgia Power, virtual teams had reduced annual commuting miles by nearly one million miles, thus reducing automobile emissions by almost 35,000 pounds.

Although the advantages and success stories of virtual teams is evident, nearly

fifty percent of all virtual teams fail to achieve their goals ("Virtual Teams," 2001). Many academic studies have been done in the field of distant education and its effectiveness. Reviews indicate that there are two major problems with distance education, a high dropout rate (Bernard and Amundsen, 1989) and the low quality of learning success (Abrami and Bures, 1996). These problems are most likely to stem from lack of class participation, but very little research has been done in this area (Webster and Hackley, 1997).

Although there are problems, a recent review of research comparing the effectiveness of distance learning and face-to-face learning indicates that there is little or no difference between the two learning techniques (Wetzel, Radtke, and Stern, 1994). It was also found that there is little difference in the effectiveness of interactive distance learning using videoconferencing and face-to-face (Storck and Sproull, 1995). Another study found that there is little difference in a course using only face-to-face learning versus face-to-face learning with an online option. In this study a concern was raised that students who are not familiar with computers and/or own a computer are at a disadvantage in distance learning (Collins, Dellana, and West, 2000). This has implications that a sector of the student population is cut off from distance learning due to class status.

## 2.4 Criteria and Personality Traits of a Successful Virtual Team

Much of the success of virtual teams depends on the information technology infrastructure, but "technology cannot substitute for the relationships that foster trust" (Kezsbom, 2000). Quite simply, the most important aspect of a successful virtual team is building trust between the members. Any team that does not have confidence, faith, and reliance on other team members is sure to have problems. Much of the reason for failure in virtual teams is because of the struggle to build trust and relationships across different time zones, cultural gaps, and geographic distances. The solution to this problem is to bring the team members face-to-face at the beginning of the project to build trust (Dash, 2001).

There are three other keys to a successful virtual team. They are:

**•Purpose**

The purpose is the glue that holds the virtual team together. Like any group project, a virtual team must have common objectives and goals they are working towards (Lipnack, 1999). Purpose is generally hard to understand when a team is not working face-to-face. For this reason, it is often worth the high costs involved in setting up face-to-face meetings at the beginning of the project in order to resolve conflicts on the purpose of the project (Kezsbom, 2000).

**•Accountability**

This can be achieved with personal interaction or virtually. Virtual teams perhaps hold team members more accountable than face-to-face teams because more communication is required during the project (Kezsbom, 2000).

**•Interdependence**

All members of a team have to feel like they are contributing to the purpose of the team. Each member should feel a sense of being part of the team. This interdependence is reliant on three factors. First, the team must have friendly interaction and personal contact. Secondly, the members should focus on developing a “Third Way” for the team. This term is a new micro culture for virtual teams in which the team is not dominated by one culture, person, idea, function, or location (“Virtual,” 2001). The final factor in creating interdependence is effective leadership on the part of all team members. Members should all possess leadership abilities and “require independent action, such as proactive discussion initiated by team members” (Alexander, 2000). For this reason it is not recommended that new employees or employees in new positions be placed on a virtual team (Cascio, 2000).

**3. Methodology**

Given the importance of virtual teams in industries and the lack of research on how effective they are in solving complex problems, an experiment was designed to answer the research questions shown in Table 1.

**3.1 Subjects**

In order to perform the experiment, students from two classes at Auburn and

LSU worked together in solving a common problem – a case study. Auburn University’s MNGT 4850 class, made up of 28 students, and LSU’s ISDS 3100 class, made up of 67 students, was divided into virtual teams and face-to-face teams. The total number of students participating was 96. The students were almost entirely between the ages of 19 and 25. The Auburn class was divided into three face-to-face teams composed of four students in each team, and eight virtual teams made up of two students in each team. The LSU class was divided into twelve face-to-face teams with four students in each team, and eight virtual teams made up of two students that joined the Auburn virtual teams. These eight virtual teams worked on the team project together but from different geographic locations. This set up allowed for a total of fifteen face-to-face teams and eight virtual teams. The instructors divided the students into face-to-face and virtual teams randomly.

**3.2 Apparatus and Procedure**

The virtual and face-to-face teams used the Chick-Fil-A case study in the experiment (Raju and Sankar, 2001). In the Chick-Fil-A case study, students were asked to analyze a proposed change in the current Point of Sale (POS) terminals that were being used in the Chick-Fil-A franchise restaurants. Restaurants were running an EPROM system on a DOS platform. Chick-Fil-A executives saw an opportunity to update the entire POS system based on either Windows® CE or Window® NT. Students were asked to come up with recommendations for Chick-Fil-A by playing the role of CIO or consultant. The teams were assigned the following roles:

- Defend the recommendation to implement the intelligent POS system by identifying the criteria for select-

ing the software, hardware, and network.

- Defend the recommendation to implement the thin POS system by identifying the criteria for selecting the software, hardware, and network.

- As a consultant, discuss the process used by Chick-Fil-A in analyzing, designing, and choosing the POS system. Critique and suggest ways of improving this process.

- Play the role of Jon Bridges (CIO) and choose a system to be implemented within Chick-Fil-A. List the criteria that you used to choose the system and how the proposals matched the criteria.

The assignment date and due dates were as follows:

The teams researched the specific system and then presented their findings in formal class presentations using Microsoft® PowerPoint and also wrote a report. The teams were responsible for keeping an accurate ledger of the time spent on the project, including all time spent in meetings (real or virtual), discussion (chat rooms, telephone, etc.), and using any other communications such as email. The face-to-face teams were able to use technologies like email and telephone, but more importantly were able to meet face-to-face.

The virtual teams relied on collaborative technologies to meet. Students were shown a presentation on Microsoft NetMeeting® 3.01 and given access to this software. This presentation was performed in both classes and included a presentation on virtual teams; then the different features of NetMeeting were displayed, including chat, file sharing, file transferring, and videoconferencing. Additionally, a website was developed that explained how to use NetMeeting and showed links for downloading the soft-

**Table 2. Assignment Dates**

Function	Auburn date	LSU date
Assigned each group specific task	February 1, 2002	February 6, 2002
Groups presented	February 14, 2002	February 27, 2002
Groups presented	February 19, 2002	March 4, 2002

ware and support services.

A posttest questionnaire using a five-point scale was given to all students so that the effectiveness of the face-to-face and virtual team groups could be compared. The ledgers from the groups were used to compare the time spent on the project. Additionally, the groups received a grade from their respective professor for a presentation using Microsoft PowerPoint.

## 4. RESULTS AND DISCUSSION

### 4.1 Do virtual teams perform better or worse than face-to-face teams?

To answer the first research question, the following survey questions on a 1 to 5 Likert scale were used with 1 being the least favorable and 5 being the most favorable.:

- Overall, my current team is very effective (actual performance versus best possible).
- Overall, my current team is very efficient (actual performance within limited time period).
- Average number of minutes spent on project per team.

The results are shown in Table 3. The above results indicate that face-to-face teams performed slightly better than virtual teams, with face-to-face team members rating effectiveness at 4.22 and efficiency at 4.31 while virtual team members rated the same categories at 3.97 and 4.10 respectively. Although the face-to-face team performance was rated a little better, the five-point scale used in the questionnaire still shows that the virtual team members rated performance at a high level. Yet there were students who were not satisfied with performance as indicated by the e-journals. One student had this to say:

- My virtual team was not effective. I think the level of technology makes a difference. I asked LSU if they wanted to use cameras, and they said, “No, let’s just use Instant Messenger (IM).”

### 4.2 Do members of virtual teams spend more or less time than members of traditional teams?

		Virtual Team n=53	Face-to-Face n=46
Goal or objective	Criteria	Mean (S.D.)	Mean (S.D.)
Do virtual teams perform better or worse than face-to-face teams?	-Effectiveness	3.97 (.9081)	4.22 (.8496)
	-Efficiency	4.10 (.9081)	4.31 (.8496)
	-Average minutes/team	341.25	291.75

To answer the second research question, the following survey question was used:

- Average number of minutes spent on project per team.

As shown in Table 4, face-to-face teams spent less time than virtual teams, with face-to-face team members spending an average of 291.75 minutes on the project and virtual teams spending an average of 341.25 minutes on the project.

### 4.3 Do members of virtual teams have a harder or easier time getting connected to team members than face-to-face teams?

To answer the third research question, the following survey questions were used:

- I felt that I was really part of our team.
- My current team members effectively communicate thoughts and ideas.
- Conflicts among team members are usually resolved effectively and positively.
- The percentage of missing members for each meeting.
- Team members had a strong sense of belonging to the team.

As shown in Table 5 on the next page, connection between team members was higher among face-to-face team members. Face-to-face team members rated “feeling part of the team” at 4.14 while

virtual teams rated it at 3.12. Face-to-face team members rated the remaining questions – team communications, conflict resolution, and sense of belonging – higher than virtual teams as well. Perhaps a source of this difference is the vast variance in team attendance. Face-to-face team members only missed 20 percent of meetings, while virtual team members missed nearly half of all meetings at 46 percent. One problem with virtual teams was that team members had to meet from 425 miles away. Great efforts were made to introduce the students to a technology that could be used to communicate with team members at a distance, yet not one virtual team used Microsoft® NetMeeting. Instead, students used technologies like email, telephone, and instant messaging. Half of the groups used AOL instant messenger. Additionally, two video cameras were available for students to use so that videoconferences could be held between LSU and Auburn, yet no students used the cameras. Perhaps the low quality of the video conferencing deterred students from using these technologies. The problem with virtual team absences and team connection was indicated in student e-journals as well.

- My Auburn partner was a huge help with the project. The virtual partners were basically non-existent.
- Our virtual-colleagues at LSU were a little difficult to contact, but it was definitely a learning experience.

		Virtual Team n=53	Face-to-Face n=46
Goal or objective	Criteria	Mean	Mean
Do members of virtual teams spend more or less time than members of face-to-face teams?	-Average minutes /team	341.25	291.75

**Table 5. Research Question 3**

		Virtual Team n=53	Face-to-Face n=46
Goal or objective	Criteria	Mean (S.D.)	Mean (S.D.)
Do members of virtual teams have a harder or easier time getting connected to team members?	-Felt part of team	3.12 (.1331)	4.14 (.3770)
	-Team member communications	3.93 (.9508)	4.09 (.9451)
	-Conflict resolution	3.97 (.9081)	4.13 (.8496)
	-Missing meeting %	46%	20%
	-Sense of belonging	3.28 (.8701)	3.97 (.9350)

**Table 6. Research Question 4**

		Virtual Team n=53	Face-to-Face n=46
Goal or objective	Criteria	Mean (S.D.)	Mean (S.D.)
Do members of virtual teams understand the mission and purpose of the project better than face-to-face team members?	-Understand mission of team	2.81 (.7173)	4.00 (.7326)
	-Understand purpose of each meeting	2.78 (.7173)	3.92 (.7326)

#### 4.4 Do members of virtual teams understand the mission and purpose of the project better than traditional team members?

To answer the fourth research question, the following survey questions were used:

- Face-to-face/virtual team members can easily understand the mission of the team.
- It is easy for face-to-face/virtual team members to understand the purpose of each meeting.

The results are shown in Table 6 at left. It shows that members of face-to-face teams had a far better understanding of mission and purpose than virtual teams. Face-to-face team students rated mission and purpose understanding at 4.00 and 3.92 respectively, while virtual team members averaged 2.81 and 2.78. These statistics show that the virtual team members did not communicate that well. Absences certainly affected team connection, as did the different due dates between LSU and Auburn classes as observed by an LSU student.

- I think the entire concept [of virtual teams] is pretty neat; however, better synchronization of due dates would be extremely helpful - the conflict in

due dates sometimes makes other members more motivated to get the project done 'early,' as theirs is due before half of the team's project is due. Therefore, the brunt of the work would be more equally distributed if the due dates correlated.

The different due dates were continuously noted by the students as causing serious problems in communications between LSU and Auburn teams. The Mardi Gras holiday that gave LSU students off classes during the middle of the project also caused trouble in virtual team communications. In reviewing students' comments and discussion, students from each school placed the blame on the other team members for the failures in virtual teams.

As aforementioned, one of the major determinants in the success of teams and especially virtual teams is having a spe-

cific purpose. The LSU students had no immediate purpose or reason for contacting Auburn students and vice versa; perhaps this is why the virtual teams did not connect at the same level as face-to-face teams. In order to be successful, virtual teams should feel an absolute need to contact all parties of the team. The Chick-Fil-A case study assignment was not arranged in this way though, as it was quite easy for team members to complete the presentation without ever having spoken with other school members.

#### 4.5 Are virtual team members more satisfied with their experience than face-to-face team members?

To answer the final research question, the following survey questions were used:

- Face-to-face/virtual team members treasure meeting opportunities more than virtual/face-to-face team members do.
- If I had a chance to do the same work again, I would rather join a virtual/face-to-face team.
- Overall, the quality of my face-to-face/virtual team's interaction was high.

As shown in Table 7, below, the most compelling statistic is that face-to-face team members had a high overall experience (4.12) and did not want to work in virtual teams (2.31), while virtual teams had a much lower overall experience (2.87) and indicated that they would rather work in face-to-face teams in the future (3.75). Students' comments included:

- I really did not care for virtual teams.
- I would just rather be in a group of four people here because it is easier to meet and work on the project. Also, the group of four is at an advantage during the presentation because they have more members participating.

**Table 7. Research Question 5**

		Virtual Team n=53	F2F n=46
Goal or objective	Criteria	Mean (S.D.)	Mean (S.D.)
Are virtual team members more satisfied with their experience than face-to-face team members?	-Treasure meeting	3.31 (.3923)	3.22 (.6857)
	-Rather be in other type	3.75 (.1331)	2.31 (.3770)
	-Overall quality	2.87 (.8093)	4.12 (.9446)

•I feel like I'll have to use virtual teams in my job, and I would really like to do it.

As aforementioned the face-to-face team members perceived their performance as better than virtual team performance. Professors oftentimes have a hard time getting students to meet in face-to-face groups; imagine how hard that becomes when teams must meet from over four hundred miles away. One instructor said that he thought the experiment using virtual teams went wonderful and that he could see the excitement in his students. Another instructor, on the other hand, felt that although the students did a nice job in their presentations the students in virtual teams were not pleased with the experience.

## 5. CONCLUSIONS

Virtual teams have become an effective way to save on time and money and many businesses use them in daily operations. But in order for virtual teams to be successful, team members must understand the purpose and mission of the project, feel like they are part of the team, and be held accountable for their work. Additionally, exact details must be worked out before the project begins, including due dates and technologies to be used. This study showed that virtual teams have a lot of potential, but take a great deal more planning and initial effort to perform at the levels of face-to-face teams.

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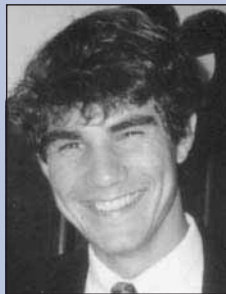
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