

Abstract

STANCIL, CHRISTIE ANNE. Pilot Study of Improving the Performance of Collegiate Baseball Players Through the Use of Visual Learning Techniques.
(Under the direction of Dr. Carolyn S. Love).

College baseball is a highly competitive sport. Schools have to win in order to gain the attention of the top prospects. For a team to be successful, players have to excel in every part of the game. The pitchers must not allow runs to score, and hitters must score runs. However, hitting is one of the hardest skills in all of sports. Nomar Garciapara says a batter is trying to hit a round ball with a round bat, square (ESPN broadcast).

The purpose of this pilot study was to compare the mechanics and performances of college baseball players before the use of video analysis and after video analysis. Through this comparison, the data collected was used to judge if the mechanics and performances of these eleven players improved.

The first objective of this study was to determine if a hitter could improve his mechanics through the use of visual learning techniques. The second objective was to see if a hitter would improve his game performances from analyzing game and practice footage. The third objective was to determine if the communication between coach and player could be improved through the use of video footage.

The objectives were accomplished through the analysis of the data collected from the North Carolina State University baseball team from 1996 to 1999. Three areas of

mechanics/performance improved significantly. The areas were hits, run batted in and home runs. Other areas of improvement helped the team win ballgames.

**Pilot Study of Improving the Performance of Collegiate Baseball Players Through
the Use of Visual Learning Techniques**

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BIOGRAPHY

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To my father, I wish you could be here to see me receive my masters degree from the university that you loved so much.

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Chapter 1

Introduction

Ted Williams said hitting is the hardest thing to do in sports. Because of the complexity of hitting, coaches and players have been searching for any tool to give them an advantage. The use of the video camera is a new means to help players learn how to correct problems in their mechanics. Athletes are now video-taped routinely in training and competition so that, after competition, coach and athlete are able to watch and analyze the athlete's actions on tape in order to identify errors and faulty technique and then correct the athlete's mechanics. The use of video bridges a communication gap between coach and athlete. A coach can tell his hitter what he is doing wrong or problems he sees, but until the athlete can see the problem, he cannot correct it. In addition, the video can show what the hitter is doing right. The hitter can believe he has a problem with his swing, and the video can show the mechanics are correct. Video extends the time for analysis. The amount of time in a swing is less than one second. The batter only has his sense of feel to detect problems in his swing. The video allows the batter to review the same swing frame by frame which he does not have the benefit of with only his sense of feel. The hitter can use the video to detect the exact location of a break in form. Without the video, the hitter could not possibly know the exact point in his swing of the break. The possibilities of detecting problems are endless with the use of video.

Statement of Problem

Division I baseball is highly competitive. Each batter is expected to perform well to improve chances for team victory. Batting mechanics must be sound in order to achieve batting averages of .300 or better.

Hypothesis

There is a direct relationship between performance statistics and exposure to visual images of batting mechanics.

Definitions

Baseball

A game played with a ball, bat, and gloves between two teams of nine players each on a large field centering upon four bases that form the corners of a square ninety feet on each side, each team having a turn at bat and in the field during each of the nine innings that constitute a normal game, the winner being the team that scores the most runs (Webster's Third New International Dictionary 1986).

Base Hit

A base hit is credited when a batter advances to first base safely:

- a. Because of his fair hit (rather than because of a fielder's error (exception - It is not a base hit if any runner is out on a force play caused by the batter

advancing toward first base or would have been forced out except for a fielding error.

b. Because a runner is declared out for being hit by a batted ball or the umpire is hit by a batted ball

c. When a fielder attempts to put out a preceding runner but is unsuccessful although there is no fielding error, and the official scorer believes the batter-runner would have reached first base with perfect fielding;

d. When a batter reaches first base safely on a fair ball hit with such force, or so slowly, that any fielder attempting to make a play has no opportunity to do so. A hit shall be scored even if the fielder deflects the ball from or cuts off another fielder who could have put out a runner;

e. When a fair ball that has not been touched by a fielder touches a runner or an umpire

Exception - It is not a base hit when a runner is called out for having been touched by an infield fly.

f. When a batter reaches first base safely on a fair ball that takes an unnatural bounce so that a fielder cannot handle it with ordinary effort, or that touches the pitcher's rubber or any base(including home plate) before being touched by a fielder and bounces so that a fielder cannot handle it with ordinary effort.

Note: In applying the above rules, always give the batter the benefit of the doubt.

A safe course to follow is to score a hit when exceptionally good fielding fails to result in a putout (Fetchiet, 2002).

Extra-Base Hit

a. A base hit for extra bases is credited to the batter when it is the sole reason for his safe arrival at a base beyond first. Any fairly batted ball that clears in flight an outfield fence in fair territory, even though it may be deflected by a fielder, is a home run, subject to local ground rules.

b. When, with one or more runners on base, the batter advances more than one base on a safe hit and the defensive team makes an attempt to put out a preceding runner, the scorer shall determine whether the batter made a legitimate two-base or three-base hit, or whether he advanced beyond first base on the fielder's choice.

c. If a batter overruns second or third base and is tagged out trying to return, he shall be credited with the last base he touched (NCAA Rules, 2002).

Exception – If put out while oversliding second or third base, he is not credited with reaching such base (Fetchiet, 2002).

Base

Any one of the four stations at the corners of a baseball infield (Webster's Third).

Double

When a batter hits a ball well enough to reach second base safely, then he is credited with a double.

Triple

When a batter hits a ball well enough to reach third base safely, then he is credited with a triple.

Home Run

A home run is scored when a batter completes the circuit of all four bases without stopping, as a result of one hit; also known as a homer (Gregory, 1998).

RBI

A run batted in is credited to the batter when a runner scores because of: A base hit (including batter scoring on a home run); a sacrifice bunt or sacrifice fly; any putout; a forced advance, such as a base on balls or batter being hit by a pitch, or an error, provided there are fewer than two outs and the action is such that the runner on third base would have scored even if there had been no error.

Earned run

An earned run shall be charged against a pitcher when a runner scores because of a safe hit, sacrifice fly, stolen base, putout, fielder's choice, base on balls, hit batter, balk or

wild pitch (even when the wild pitch is a third strike), provided that in each case it is before the defensive team has had an opportunity to make a third putout (Fetchiet, 2002).

Batting Average

The number of official times at-bat divided into the number of base hits.

Batter

The offensive player positioned in the batter's box.

Official at bat

An official at bat shall not be charged against a player when he hits a sacrifice bunt or sacrifice fly, is awarded a base on balls, is hit by a pitched ball or is awarded first base because of interference or obstruction (Fetchiet, 2002).

Sacrifice or sacrifice fly

A sacrifice bunt is credited to the batter when, with fewer than two outs, his bunt enables a runner to advance, provided no other runner is put out attempting to advance.

A sacrifice fly is credited when, with fewer than two out, his fly, fair or foul, enables a runner to score. In either case, the sacrifice ruling applies when the batter is put out before he reaches first base or would have been put out if the ball had been fielded without error (Fetchiet, 2002).

Pitching Definitions

Change of Pace or Changeup

A slowly pitched ball, thrown in an effort to deceive the batter into thinking it is a fastball thereby throwing off the batter's timing (Dickson, 1999).

Curveball

A baseball pitch in which the ball swerves or appears to swerve from its normal or expected course of flight because of a spin put on it in delivery (Webster's Third International Dictionary, 1986).

Fastball

Overhead pitch thrown at top speed and with great power. It has a relatively even trajectory but usually has a backward spin, which can cause it to hop when it reaches the plate. It is the most common pitch in baseball (Dickson, 1999).

Knuckleball

A baseball pitch made by gripping the ball with the knuckles or fingernails of the index and second and sometimes third fingers pressed against the top of the ball and thrown usually with little speed or spin so as to give it a typically erratic course (Webster's Third International Dictionary, 1986).

Slider

A modified curveball that is rolled or slid-out of the hand, rather than spun hard. It has less motion than a pure curve and breaks slightly but sharply just as it is crossing the plate. In other words, it starts out like a fastball and then breaks without warning like a curve (Dickson, 1999).

Slurve

A pitch that slides and curves. It curves more than a slider and is faster than a curveball (Dickson, 1999).

Strike

- a. A legal pitch struck at by the batter without the ball touching the bat;
- b. A legal pitch that enters the strike zone (the area over home plate directly below the batter's armpits through the bottom of the kneecaps when assuming a natural stance) in flight and is not struck at;
- c. A legal pitch that becomes a foul not caught on the fly when the batter has fewer than two strikes;
- d. An attempt to bunt that results in a foul not legally caught;
- e. A legal pitch that touches the batter when the batter swings and misses;
- f. A foul tip, and
- g. Awarded after the batter fails to take a position in the batter's box immediately after ordered by the umpire.
- h. Awarded if the batter deliberately steps back in the box or swings in such a manner to attempt to create catcher's interference. If the swing hits the catcher or

the mitt, the batter shall be called out. All base runners shall return to the base occupied at the time of the pitch (Fetchiet, 2002).

Videography

The art of using a video camera to film movement and action. The use of video bridges a communication gap between coach and athlete. A coach can tell his hitter what he is doing wrong or problems he sees, but until the athlete can see the problem, he has a harder time correcting it. In addition, the video can show what the hitter is doing right. The hitter can believe he has a problem with his swing, and the video can show the mechanics are correct. Video extends the time for analysis. The amount of time in a swing is less than one second. The batter only has his sense of feel to detect problems in his swing. The video allows the batter to review the same swing frame by frame which he does not have the benefit of with only his sense of feel. The hitter can use the video to detect the exact location of a break in form. Without the video, the hitter could not possible know the exact point in his swing of the break.

Learning style

The way in which each learner begins to concentrate on, process, absorb, and retain information (Dunn, 1988).

Teaching/coaching styles

Teaching style consists of a teacher's personal behaviors and the media used to transmit

data to or receive it from the learner (Kaplan and Kies, 1995).

Dubbing

The process of re-recording footage previously shot onto another tape.

Chapter 2

Literature Review

Improving Athletic Performance

Information processing plays a particularly important role in sports where time pressure and uncertainty occur (Ripoll, 1991). Analysis of expert athletes' behavior shows that high level skill demands the coordination of sensorimotor and semantic visual function to reach a high level of performance (Ripoll, 1991). The roles of these two functions given by Ripoll are that the semantic visual function is used to identify and interpret the situation. The role of sensorimotor visual function is to carry out the response. The relationship of the visual functions is especially important in sports such as baseball, table tennis, basketball and others because of the uncertainty of play. A difference between experts and novices concerns the mode of visual scanning which is synthetic in experts and analytic in novices, respectively (Ripoll, 1991). Synthetic analysis, as defined by Ripoll, consists in directing the gaze in a position from which the maximum of events can be seen and grouped from one visual fixation.

The time leading up to any competition is filled with hours, days and even years of practice. The maximum effectiveness practice can be is the subject of a recent study of skill acquisition. The main focus is on the ecological approach to the acquisition of co-ordination and its implications for pedagogical practice in the sport and exercise sciences (Handford, Davids, Bennett, Button, 1997). Many complex sport skills are rather artificial and stylistic, and it has been argued that the intention of the system in such skills is constantly competing against the powerful constraints of natural structural

design and musculoskeletal properties (Jensen et al.,1989). This reasoning supports the common belief that the development of proficient performance in sport is an extensive process, requiring much repetition, often spanning many years of practice (Ericsson et al.,1993). This repetition is especially important in the mechanics of baseball. Consider the task of acquiring skill in a tennis forehand stroke, the problem for the learner is one of co-ordinating the many independent muscles (800) of the upper and lower body which are acting around numerous joints (Wells,1976). This huge number of system degrees of freedom actually represents a 'curse' for computational accounts of skill acquisition and performance (Kugler and Turvey,1987). It follows that a highly variable movement pattern is undesirable at all stages of learning (Handford, Davids, Bennett, Button,1997). The goal of successful skill acquisition programmes is believed to be the reduction, and ultimately the elimination, of system noise (Handford, Davids, Bennett, Button,1987). Despite the intuitive appeal of this line of reasoning for sports skill acquisition, this view of performance variability has only been substantiated for tasks in which a reduction in movement variability is essentially the goal (Handford, Davids, Bennett, Button,1987). This reduction of variability is crucial in the sport of baseball. The use of video helps the batter remove all variations in his swing and helps the pitcher remove all variations in his arm movement.

The feats of eye-limb co-ordination achieved by top sports players indicate that they are remarkably good at moving a bat or a hand to the right place at the right time (Regan, 1997). Circumstances in which the interval between first seeing the ball and the completion of the catch or hit is so short that no visually guided modification of the motor response is possible after its initiation are comparatively rare (Regan, 1987). In

sport, however, it is almost always the case that the ball's flight is sufficiently long that visual information can be used to guide the motor action after the motor action has been initiated (Regan, 1987). Regan says the expression 'keep your eye on the ball and don't commit yourself too early', emphasizes the importance of updating visual information right up to the instant during the ball's flight, after which neural conduction delay precludes any further visually guided modification of the motor action. Because of the limited amount of time the batter has before a pitch reaches him, the batter must rely on a mechanically sound swing to enable him to get a hit. The use of video helps a batter achieve the swing he needs.

Learning Styles

Learning is an interesting process. It is the direct result of teacher and student interaction within a classroom. Each student has preferences of how to learn. Because learning is an internal process, the teacher knows that a student has learned only when he or she notices a change in the learner's behavior. Recognizing and defining the styles by which a person learns is as important to the learning process as diagnostic tests are to the healing process in the field of medicine (Kaplan and Kies, 1995). Learning style consists of distinctive and observable behaviors that provide information to the educator about the student. Learning styles emerge from inborn, natural predispositions. They need to be recognized, brought out, encouraged, unfolded, developed, and disciplined (Kaplan and Kies, 1995).

David Kolb (1984) developed a learning style model to determine the preferred learning style of any student. This model was used in an experiment to see if its

application could improve the quality of field education. The four primary dimensions of his model are: (a) Concrete Experience, or learning through **experience**; (b) Reflective Observation, or learning through **examining**; (c) Abstract Conceptualization, or learning through **explaining**; and (d) Active Experimentation, or learning through **applying** (Kolb, 1984; Smith & Kolb, 1986; Svinicki & Dixon, 1987). Kolb believes that each student has a preferred style among the four, but the student must complete all four stages to have a complete learning experience. The research conducted using this model concluded that agency field supervisors could effectively match their supervisory styles with the learning styles of their students.

Video Production

Nikos Theodosakis (2002) believes that filmmaking can inspire learning. With the use of video cameras, teachers can enhance the learning experience for their students. Digital cameras and editing software have enabled educators to explore the use of digital video as a serious tool for teaching and learning. Subjects like social studies could be easier to learn with the use of a video camera. For example, students could act out specific events in history. Other students could film the event, and the class could watch the film that was made. In foreign language classes, the students could write a script and turn it into a dramatic piece. The students in English class could act out poems, sonnets or original works. Through the use of a video camera, parts of these subjects could be captured and watched on television. The students can use their visual learning skills to retain the information in each subject. Beyond the engaging exploration of the curriculum content itself, filmmaking has the potential of equipping students with the tools and experiences for life beyond the classroom.

Teaching to Students with Different Learning Styles

Every student is unique in his or her own way, and educators must learn how to teach to students with diverse learning styles. Four educators decided to do a case study concerning learning styles. For the study, eight teachers in the K-12 public school system were interviewed and observed. The data was analyzed for common themes. The educators were interested in what teachers know about learning styles, how that knowledge is reflected in their classroom practice, and how teachers think and speak about learning (Haar, Hall, Schoepp and Smith, 2002).

The main question this study tried to answer was “how do teachers instruct students with different learning styles?” Subquestions were created to help with answering this question. They were:

What kind of training or exposure have teachers had to learning styles? Why do teachers utilize learning styles in their teaching? How do teachers describe the framework they use to talk about learning styles? How do teachers identify learning styles? How do teachers adjust their teaching to account for different learning styles? How do teachers know that they have achieved their desired outcome-student learning?

Three themes were created based on those questions. The first theme was about what the teachers say about their students learning styles. The teachers seemed to identify a student as a kinesthetic learner as opposed to a visual learner. The teachers did not have to remember the names of the different learning styles, but they could identify the types of learners they had in their classrooms.

The second theme was how the teachers respond to the students’ different learning styles. They used tests and quizzes to see if the students were mastering their lessons. They also tried to reach each student on a personal level to judge his or her

progress. The teachers realized that their students needed reteaching on subjects they already understood. This reteaching was an integral part of what many of the teachers did to reinforce student learning.

The third theme was why do teachers respond to their students' different learning styles. The teachers felt that they had a responsibility to the students. The desire the teachers showed to help their kids learn appeared to be innate. They identified individual styles and worked with students, actively seeking out the best ways to connect with them. The writers felt the actions of the teachers answered the main question. They taught in whatever way was needed to reach each student.

Teaching/Coaching styles

The teacher is generally perceived as a facilitator of learning--the most significant source to help the student learn (Kaplan & Kies, 1995). This ideal is true for coaches also. One of the problems facing athletes and coaches is the ability to recall the playing conditions for post-game assessment. A study of six junior orienteers involved each athlete wearing a head-mounted video camera during competition. This action generated a video record of events from the participants' point of view. The footage recorded for each athlete was replayed in two stages. The first stage was used to help the athlete remember and talk about the performance-related mental events. The second stage was the same footage viewed by coach and athlete. In many sporting situations it is usually the case that (a) cameras or recording personnel risk intruding on the action, (b) athletes move rapidly and/or over considerable distances, (c) camera line of sight is frequently blocked, and/or (d) the camera's perspective provides information which differs in

important detail from that of the athlete (Omodei and McLennan, 1994). However, use of a head camera did not interfere with the action in anyway and provided images from the athlete's perspective. Own-point-of-view video-assisted recall was shown to be superior to unaided post-event recall in (a)the amount of cognitive and affective material recalled, and (b)the immediacy and intensity of what was recalled; including both positive and negative self-referent content, indicating that the athlete's recall was less influenced by self-protective distortion or denial processes (Omodei, McLennan, Whitford, 1998). The result of orienteers' use of the video cameras resulted in a 23.2% improvement in performance.

Video for Instruction

The use of video for instruction has been used in other areas besides athletics with the same results. Brad Stith (2000) a biology professor at the University of Colorado in Denver, developed a web site to aid his students in their studies. His class met twice a week, but Stith wanted to supplement the class time. Stith wanted to utilize the ability of the web to allow students access to illustrations and movies. Through the use of video, students had the ability to view additional material along with the material that the professor talked about in class. The video on the web allowed the students a second chance to study what the professor was showing them in class. Class is a finite period of time, but the students could view the same material at their leisure because of the web. He believes that the use of video and animation both in lecture and on the web is one of the major advantages of computers in teaching.

Not every student is going to fully understand a concept the first time he or she sees it, so being able to study the subject again is vital. Also it is important for a student to see on his or her own what is being explained.

Boston Bruins

Many professional teams use video to record games. The footage is used for review of what the team did right or wrong. The Boston Bruins is one team that utilizes technology to improve performance. Nikolai Bobrov (2001) is their video coordinator. Bobrov takes the video and enters it into the computer. He breaks down the video into game segments, so coaches and players can go to exact plays and situations in a game. Bobrov can also track individual players, so coaches can analyze everything he did in a particular game. This article is similar to my study because this is another example of how video can be used for improvement. "Coaches can bring players in to show them what they did and what they didn't do" (Bobrov). The video allows players to see their actions and mechanical problems that they were not aware of doing.

Chapter 3

Methods

Introduction

Good hitting mechanics are crucial for a player to be successful because of the different challenges pitchers create. If a pitcher threw the ball straight and slow, hitters would have a much easier time at the plate. However, pitchers throw different pitches at different speeds in different ways. The most common pitches are the fastball, curveball, slider and change-up, but each of these pitches can be thrown in different ways.

For instance, the fastball has the highest velocity of all the pitches that a pitcher throws, but a pitcher can vary the speed of his fastball. He can throw a fastball with movement such as sink and cut as well. Along with the fastball, most pitchers throw a curveball.

Besides the different pitches, hitters also face pitchers with different throwing styles. The arm slot for pitchers is over the top, three-quarters or side arm. Over the top means the pitcher comes around, and his arm is straight above his shoulders in a ninety-degree angle. Three-quarters means the arm is in a forty-five degree angle. Side arm means the pitcher throws pitches with his arm almost parallel to the ground. Pitchers can vary the arm slot, but most pitchers use the same arm motion.

A hitter will also see a different look depending on the height of a pitcher. Taller pitchers seem to throw down meaning all their pitches start high and fly downward. Shorter pitchers tend to throw at an even level with the batter. Movement also plays a factor in every pitch. Movement is whether the ball sinks, cuts or flies straight. In

addition, taller pitchers release the ball closer to the plate than shorter pitchers because of their height. A 6'11 man is going to extend farther out than a 6'0. By releasing the ball closer to the plate, the taller pitcher cuts down on the flight time to the plate which gives the hitter less time to see the pitch. Pitchers also vary in their delivery as well. Some pitchers have smooth deliveries while other are more stiff. Some pitchers are better about hiding the ball in their motion more than others. Pitchers vary the location of their pitches. Some pitches are thrown on the inside part of the plate, close to the hitter, or on the outside part of the plate, away from the hitter. Some pitches are thrown high, low or in the middle above the plate. The range of the strike zone is from a hitter's knees to the middle of his chest. If the batter is tall, then his strike zone is larger than a shorter hitters' strike zone.

Sample

Similar to Stith (2000), my study with a Division I NCAA baseball team was based on visual learning techniques. Throughout the 1997, 1998 and 1999 seasons, the writer filmed for the North Carolina State baseball team. A sample of convenience included eleven position players who were selected because of multiple year availability to the researcher.

Research Design

A quasi-experimental pretest posttest design was used to test the hypothesis. The pretest included reviewing student athletes' batting averages, hits, doubles, triples, runs batted in and home run statistics at the beginning of two seasons (see Appendix B). The

posttest involved reviewing position players' performance statistics after the treatment was applied. In addition, data was collected through the use of an eight-question mailed survey to the eleven position players in 2000.

Treatment

In the spring of 1997, the writer starting working for the North Carolina State baseball team as a videographer. The work included shooting footage of the position players in batting practice and game situations. During the 1997 season, the players were filmed in batting practice once or twice a month in addition to filming almost every game. The position for filming the games was directly behind home plate and beside the cage on the hitter's open side in batting practice. Each hitter would take three rounds of hitting off the pitching coach or assistant coach. The players were filmed on their open side because it was the best angle for coach and player to see what the player was doing with his hands and arms. This angle allowed for review of all parts of the players swing.

After the conclusion of batting practice, the player would sit with assistant coach Billy Best and analyze what he was doing right or wrong. Coach Best would then give instruction to that player about what changes he needed to make in his mechanics. Also, he would compliment the player on positives in his mechanics. Because of the videotape, each athlete was able to see what the coaches were telling him instead of just hearing the instruction. The player would apply the new instruction to his workouts and make the needed changes. Sometimes players would say they did not know what they were doing wrong until they saw their mechanics on tape. After some time had passed, the hitters

would be filmed again to see if they had improved. Besides batting practice, all the players had game footage from every game to watch and see how he performed.

The videographer role became more involved in the 1998 season because filming of batting practice took place more often. In addition to shooting footage in the spring, the videographer started playing a more active role in the fall and winter seasons. The team would practice for a month in the fall with intersquad games and batting practice. In the winter, the hitters would take batting practice at regular intervals with Coach Best in the cages in the basement of Reynolds Coliseum. The number of times that filming batting practice took place increased in the spring from one to two times a month in 1997 to three or four times a month in 1998. The team also included the videographer on more away trips, so more games were available for review by the players and coaches.

In the final year with the team, videography played an important part of the hitters' development in the 1999 season. The videographer was involved on a daily basis with fall, winter and spring seasons. The filming of batting practice was done every time the team took it.

Equipment Advances

The first camera used was a Sony 8 millimeter. The tapes from the camera could not be played in a VCR because the tape was too small. The tapes would be taken from the camera, and the footage would have to be dubbed onto a VHS tape before the players or coaches could review any footage. The same tape was used for batting practice and games. Because of classes and other activities, sometimes the time between game/practice to review was a few days. Also, when a tape is dubbed onto another tape,

the film loses some clarity and the quality is not as good. This camera was used for the 1997 and 1998 seasons. However, in the 1998 season, the writer would dub the footage taken at practice or games immediately following the event and get the tape to the players and coaches as soon as possible. During the 1999 season, the camera that was used was a super VHS. With this camera, the footage did not have to be dubbed because the tape for this camera could be played in any VHS VCR.

Survey

The survey was administered through the United States mail service with a postage paid envelope included for responses from the eleven position players. Six of the eleven players replied for a response rate of 55 percent. The questions were as followed:

1. What percentage of your daily training routine involved reviewing video in the locker room, coaches' office, field, home, etc? A. less than 5% B. 5-20% C. 21-30% D. more than 30%
2. Did additional exposure to video analysis prove to be beneficial to your development as a hitter? A. yes B. no If yes, in what ways?
3. Did video help you illustrate your thoughts to the coaches about your hitting mechanics that you could not explain in words? A. yes B. no If yes, examples.
4. Could you see mechanical flaws in the video that you could not feel yourself making?
A. yes B. no
5. Did seeing your improved hitting mechanics on video improve your confidence at the plate? A. yes B. no If yes, how?

6. How much difference did having videography make as opposed to not having it?

7. In your opinion/perception, how did videography improve your performance in general?

8. If you were drafted or signed as a free agent, did video analysis in college prepare you for video analysis in professional baseball?

General Comments:

Chapter 4

Results

Discussions and Statistics

The hitters would look at the video at the field with the coach and get immediate feedback. However, each hitter only got limited time for review at the field. I always made copies of what I filmed, so each hitter could take a tape home with him for additional review. The hitter would watch himself and visit with the coach in his office if the hitter saw other problems or attributes in his swing that was not detected the first time viewing the footage. The statistics are believed to be influenced by the student athletes' visual learning experiences (video analysis).

Batting Average

The overall success of a hitter is determined by that player's batting average. Changes for the better or worse in average means the overall performance of that player changed. In the study performed with the North Carolina State University, the pretest for the players involved had a mean of .299 with a standard error of .0284624 and a standard deviation of .0943992 at the .05 level. After my involvement with the eleven players in the study, the mean changed to .3357273 with a standard error of .0137107 and a standard deviation of .0454733 at the .05 level. The difference between the pretest and the posttest mean is -.0367273. The difference in the standard error was .0267511 and .0887233 in the standard deviation. The paired t test proved the difference to not be significant at the .05 level.

Table 1 Batting Averages Paired t-Test

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
avg1	11	.299	.0284624	.0943992	.2355818	.3624182
avg2	11	.3357273	.0137107	.0454733	.3051779	.3662766
diff	11	-.0367273	.0267511	.0887233	-.0963324	.0228778

Ho: mean(avg1 - avg2) = mean(diff) = 0

Ha: mean(diff) < 0 Ha: mean(diff) ~ = 0 Ha: mean(diff) > 0

t = -1.3729 t = -1.3729 t = -1.3729

P < t = 0.0999 P > |t| = 0.1998 P > t = 0.9001

Hits

The main objective of a hitter is to get a hit every time up at the plate. Getting a hit at every plate appearance is almost impossible, but the more hits the better. In the pretest for hits, the mean was 40.63636 with a standard error of 10.6432 and a standard deviation of 30.13787. In the posttest, the mean changed to 59.90909 with a standard error of 9.086908 and a standard deviation of 30.13787. The difference in the mean between the pre and posttest was 19.27273 with a 5.074161 change in error and 16.82909 change in deviation. The paired t test of hits proved to be significant at the .05 level.

Table 2 Hits Paired t-Test

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
hits1	11	40.63636	10.6432	35.2995	16.92184	64.35089
hits2	11	59.90909	9.086908	30.13787	39.6622	80.15598
diff	11	-19.27273	5.074161	16.82909	-30.57866	-7.966793

Ho: mean(hits1 - hits2) = mean(diff) = 0

Ha: mean(diff) < 0

Ha: mean(diff) ~ = 0

Ha: mean(diff) > 0

t = -3.7982

t = -3.7982

t = -3.7982

P < t = 0.0017

P > |t| = 0.0035

P > t = 0.9983

Doubles

In baseball, one thing that is better than a hit is a hit where the hitter reaches second base. This type of hit is a double. Doubles are better because they can score a runner that is already on base. In the pretest for doubles, the mean was 8.545455 with a standard error of 2.816715 and a standard deviation of 9.341987. The posttest had a mean of 10.63636 with an error of 1.879423 and a deviation of 6.233341. The difference in mean was 2.090909 with a 2.184468 difference in error and a 7.245061 difference in deviation. The paired t test at the .05 level proved the changes in doubles to not be significant.

Table 3 Doubles Paired t-Test

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
doub1	11	8.545455	2.816715	9.341987	2.269422	14.82149
doub2	11	10.63636	1.879423	6.233341	6.448748	14.82398
diff	11	-2.090909	2.184468	7.245061	-6.958207	2.776389

Ho: mean(doub1 - doub2) = mean(diff) = 0

Ha: mean(diff) < 0 Ha: mean(diff) \neq 0 Ha: mean(diff) > 0

t = -0.9572 t = -0.9572 t = -0.9572

P < t = 0.1805 P > |t| = 0.3610 P > t = 0.8195

Triples

One of the hardest plays in baseball is hitting a triple. After a hitter hits a triple, he is only one base away from home which scores a run. Also, if a runner is on base and the hitter hits a triple, a run is guaranteed to be scored. In the pretest, the mean was 1.909091 with a standard error of .8252222 and a standard deviation of 2.736953. In the posttest, the mean was 1.818182 with an error of .6002754 and a deviation of 1.990888. The difference in mean was .0909091. The difference in error was .5126499 and a 1.700267 difference in deviation. The paired t test proved the change in triples to not be significant at the .05 level.

Table 4 Triples Paired t-Test

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
trip1	11	1.909091	.8252222	2.736953	.0703812	3.747801
trip2	11	1.818182	.6002754	1.990888	.4806848	3.155679
diff	11	.0909091	.5126499	1.700267	-1.051346	1.233164

Ho: mean(trip1 - trip2) = mean(diff) = 0

Ha: mean(diff) < 0

Ha: mean(diff) ~ = 0

Ha: mean(diff) > 0

t = 0.1773

t = 0.1773

t = 0.1773

P < t = 0.5686

P > |t| = 0.8628

P > t = 0.4314

Home Runs

The ultimate hit in baseball is the home run. A player has to hit a ball almost perfectly to hit a home run. A home run is also the most exciting and crowd arousing play in baseball. In the pretest, the mean for home runs was 3.727273 with a standard error of 1.307954 and a standard deviation of 4.337993. In the posttest, the mean was 7.909091 with an error of 1.836274 and a deviation of 6.090231. The difference in the mean of home runs was 4.181818 with a difference in error of 1.077186 and a difference in deviation of 3.572623. The paired t test proved the change in home runs to be significant at the .05 level.

Table 5 Home Runs Paired t-Test

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
hr1	11	3.727273	1.307954	4.337993	.8129695	6.641576
hr2	11	7.909091	1.836274	6.090231	3.817618	12.00056
diff	11	-4.181818	1.077186	3.572623	-6.581939	-1.781697

Ho: mean(hr1 - hr2) = mean(diff) = 0 Ha: mean(diff) < 0
 Ha: mean(diff) ~ 0 Ha: mean(diff) > 0
 t = -3.8822 t = -3.8822 t = -3.8822
 P < t = 0.0015 P > |t| = 0.0030 P > t = 0.9985

RBI's

A hitter also achieves success from using his bat to score other players that are already on base. This play is called a run batted in or a RBI. With each rbi, the team scores another run which gives the team a higher score. If the team's score is higher than the other team's score, then the first team wins the ballgame. A hit, double, triple or home run can be used to score a runner that is on base. In addition, a sacrifice fly or sacrifice bunt a hitter performs can score a run. In the RBI pretest, the mean was 27.63636 with a standard error of 6.355059 and a standard deviation of 21.07735. In the posttest, the mean was 44.63636 with a standard error of 7.139229 and a standard deviation of 23.67814. The difference in mean was 17 with a 4.227615 difference in error and a 14.02141 difference in deviation. The paired t test proved to be significant at the .05 level.

Table 6 RBIs Paired t-Test

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
-----+-----						
rbi1	11	27.63636	6.355059	21.07735	13.47641	41.79632
rbi2	11	44.63636	7.139229	23.67814	28.72917	60.54356
-----+-----						
diff	11	-17	4.227615	14.02141	-26.41971	-7.580287

Ho: mean(rbi1 - rbi2) = mean(diff) = 0

Ha: mean(diff) < 0

Ha: mean(diff) ~ 0

Ha: mean(diff) > 0

t = -4.0212

t = -4.0212

t = -4.0212

P < t = 0.0012

P > |t| = 0.0024

P > t = 0.9988

Survey Responses

Question 1

Five players (83%) responded by saying five to twenty percent and one player (17%) said more than thirty percent.

Question 2

All six players (100%) answered yes to this question, but their responses to the ways it proved to be beneficial varied.

Response 1: It (video) broke down your swing in the different phases and you saw what was good and what was bad. When you saw your mechanical flaws on video you become more conscience of then during BP (batting practice) and made you work hard to improve.

Response 2: It gave a visual instruction to match the audible instruction.

Response 3: My first three years in college, I had to rely on coaches and teammates to tell me what needed to be worked on. With video analysis, I could see what I was doing wrong and it made it easier to make adjustments and become a better hitter.

Response 4: It allowed us to work on the mental/visual aspect of hitting away from the cages or the field.

Response 5: By watching video, you see things you're doing wrong that you might not have realized otherwise.

Response 6: Video was a tremendous help in developing my swing. It allowed me to critic my mechanics and see flaws that I could not feel when I was playing.

Question 3

Four players (67%) answered yes and gave examples and two players (33%) answered no.

Response 1: As someone who teaches hitting lessons during the off season, video make it easier to break down a students swing and allow them to see their mistake. Otherwise, most kids won't understand what you are talking about because they don't have the knowledge or experience yet.

Response 2: If I asked the coaches to look for a certain problem with my mechanics, it was much easier to show them what I thought I was doing wrong on video, then trying to sit and explain everything.

Response 3: If I couldn't explain in words, I could point to the tv and say "...", or vice-versa.

Response 4: It was a great help in the communication between my coach and myself.

Video allowed us to see things and talk about these mistakes while we watched the video together. It really allowed for fewer slumps because I could understand what I was doing more quickly.

Question 4

All six players (100%) answered yes to this question.

Question 5

All six players (100%) answered yes to this question and gave examples.

Response 1: When you feel confident in practice you will feel confident in the game.

However, sometimes being aware of mechanical flaw and studying video tape too much could cause you to think during the game. I have heard the phrase “Too much analysis equals paralysis.”

Response 2: When seeing my mechanics improve, I started to trust my mechanics more because of better results in practice, which over time built confidence.

Response 3: After watching video and seeing the things you do, correctly, it makes you feel that much better about your approach to hitting. You feel that you can't get out if you do things correctly at the plate.

Response 4: Positive mental and physical reinforcement not only improved muscle memory but helped develop a mental stance, a starting point.

Response 5: Lets you compare your new swing vs old swing to see that you're making changes.

Response 6: Correcting my mistakes and seeing my development happen, gave me a lot more confidence in game situations. I was a better hitter because all I concentrated on was seeing the ball, not what my swing was doing.

Question 6

All six players (100%) replied to this question and gave examples.

Response 1: It made me aware of the things I needed to work on. I'm a visual learner and video allowed me to become physical aware of my flaws.

Response 2: A lot

Response 3: Not having it, you have people telling and trying to show you what you are doing wrong. Seeing the problems with your own eyes makes a huge difference. You know what made you do this or that and you can make the changes necessary.

Response 4: A lot. It was very instrumental in my development as a hitter.

Response 5: Again, you pick up on things you might not realize you're doing and also things that you might not see unless its slowed down.

Response 6: Video allowed me to make adjustments more quickly.

Question 7:

All six players (100%) replied to this question as shown below:

Response 1: Video had a little to do with me improving. You can't replace hard work and quality repetitions in the batting cage. Video is a good learning tool especially for younger kids.

Response 2: It gave me a "true" checklist that made slumps shorter and possibly stopped them before they started.

Response 3: It helped me prove to myself that I could compete on the college level. Though I did not move on to professional baseball, I was confident that I could have competed on that level. The introduction to video analysis is something that improved my whole game and I would recommend it to anyone.

Response 4: Seeing yourself perform a task over and over the correct way builds a sense of mental strength. No matter what the situation I felt prepared.

Response 5: Makes you a better hitter because it enables you to see changes being made.

Response 6: Video allowed me to have a more complete season from beginning to end.

Once I recognized my problems, I had a very consistent season.

Question 8

Three players (50%) replied to this question as noted below:

Response 1: As a professional, we got video taped at the beginning, middle, and end of each season at the minor league level. The Seattle Mariners video tape their players each at bat and is available for them after each at-bat to review.

Response 2: Yes, I no longer depend on a coach for instruction.

Response 3: We did not use video analysis with the Houston Astros organization. I was much more prepared in college because of video.

There were no general comments given by any of the players surveyed.

Chapter 5

Conclusion

The statistics revealed changes in almost every category which implies that my involvement with the team was beneficial. My camera work for the eleven student athletes involved in the study helped them become better players. Not every player improved his batting average, but every player improved in some area. Even if a player only improved in the number of hits, double, triples, home runs or runs batted in, those improvements helped the team win more ballgames. More runs equals more wins which seem to be the most important goal in sports. There were other factors that played a part in their performances such as coaching, training and personal changes, so I cannot conclude that my camera work was the sole cause of the better performances with the eleven players. However, I do conclude that my camera work was a major factor in helping the players become the hitters they wanted to be.

Recommended changes for future studies are to select samples from two different populations of student athletes, and one team utilizes video and another serves as a control group that does not use video. That way, the researcher could compare the two groups to determine the effects of the videography. Another recommendation is to perform a study with a pretest of players who have not used video analysis of their baseball mechanics, and then after a season utilizing videography, perform a posttest on those same players.

Similar to the perceived positive impact of videography on performance as reported by the players, I also had positive experiences. For example, I became a part of the coaching and learning team. This involvement helped boost my confidence level and self-esteem. The travelling and comradery with the other student athletes created lasting memories.

The outcome of this study was a career for me. The work I did with the North Carolina State baseball team gave me the experience to earn a job with Major League Baseball. My job entails travelling around the country and filming the top prospects. The film is analyzed by the scouting directors. The directors are looking for the same attributes and flaws in the mechanics of each player that the coaches and players were looking for at North Carolina State University.

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Appendix A: Cover Letter

317 Latimer Rd.
Raleigh, NC 27609

Dear Players,

As you know, I filmed for the North Carolina State baseball team for many years. My involvement included attending and filming all games and practices. My films were used for review and instruction. I have turned the work I did with the team into the theme of my thesis for my master's degree. I hypothesized that the use of video aided in your development as a hitter, and I need your help to determine the impact of this review and instruction approach. Please fill out the following survey about your experience with the use of video to the best of your ability. Your assistance is crucial in helping me accomplish my educational goal.

Please use the enclosed stamped envelope to return your survey to me. An early response will be greatly appreciated.

Thank you,

Christie Stancil

**Appendix B: Raw Data of Batting Averages, Hit, Doubles, Triples, Home Runs and
Runs Batted In**

	Average	Hits	Doubles	Triples	Home Runs	Runs Batted In
Player 1						
1998	0.238	5	2	0	0	5
1999	0.346	36	12	1	2	21
Player 2						
1996	0.5	8	1	0	0	10
1997	0.324	24	5	0	0	15
Player 3						
1996	0.286	48	3	2	12	35
1997	0.337	86	12	0	17	76
Player 4						
1998	0.273	41	7	1	2	39
1999	0.256	50	7	2	4	39
Player 5						
1996	0.299	38	13	3	3	33
1997	0.308	57	8	1	9	43
Player 6						
1998	0.217	10	1	0	1	11
1999	0.308	16	1	0	2	14
Player 7						
1996	0.269	29	7	0	2	15
1997	0.356	68	11	3	6	47
Player 8						
1996	0.317	78	17	4	3	34
1997	0.412	100	14	4	16	68
Player 9						
1998	0.393	105	31	2	11	66
1999	0.367	87	18	3	16	73
Player 10						
1996	0.354	84	12	9	7	55
1997	0.391	99	23	6	9	68
Player 11						
1996	0.143	1	0	0	0	1
1997	0.288	36	6	0	6	27