

# SEEING BELOW<sup>THE</sup> SURFACE

How Technology Can Make Coaching a Shared Experience

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### **Seeing Below the Surface: How Technology Can Make Coaching a Shared Experience**

#### **Introduction**

In collegiate level swimming, swimmer's are recruited based not only on their best performances but also according to how they fit into a team. In other words if a coach knows the university will need a mid-distance butterflyer, because they have a senior graduating at the end of the year, during their recruiting process they will devote time to searching countries for a butterflyer that they can place in that position on their team. Once the swimmer has been admitted to the university and starts to train with the team, the college coach will spend a great deal of time helping his or her new swimmer develop their technique. Often the swimmer's technique is entirely revamped from his or her days as an age group swimmer, competing on a club team before being recruited to a college. During this stroke technique development process massive collaboration takes place between the coach and swimmer, as they work together to develop the athletes stroke into an elite level stroke, primed for elite level competitions. However, part of the process is also comparing the swimmers stroke to an already developed elite level prototype, also known as a golden standard. In many cases, the exchange between the coach and athlete then becomes focused on making the swimmer's stroke conform to the same technique displayed by the golden standard. The problem with this is that many factors, such as weight, height, wingspan, double-jointed elbows and shoulders, among many others can vary from person to person. Hence, conforming to a prototype may not have the same effect for every swimmer. This leads to the question: How can stroke technique become coached for individualized standards?

In order for individualized stroke technique to be coached, several events must first occur and there is no better time to initiate these practices than when the swimmer is young. First, the coach must learn to become a facilitator rather than an omniscient lecturer. Coaches, especially at the age group level, will tell their swimmers "what to do" and "how to do it", however, this leads to the "why" often being lost on the swimmer. If a coach can learn to facilitate critical thinking in their athletes during training, the swimmer will not only learn "what to do" and "how to do it", but they will learn "why" it is done the way it occurs. Furthermore, if the swimmer can learn which forms developed in stroke technique work best for them as individuals, then they are positioned to take a more active approach in collaborating with their coach to develop a technique that is personalized based on their weight, height, wingspan, joints and a multitude of other factors. So, what is the benefit of personalized stroke technique?

Conformity to a proven successful standard, will undoubtedly prove successful for many swimmers, and will help them succeed to a certain point. However, as the history of successful swimmers has proven, such as in the odd proportions of Michael Phelps' body; conformity can help a swimmer make a splash, but those that develop their own standard are those that make tidal waves.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Therefore, this study takes the first step towards developing personalized stroke technique by focusing on helping to develop the “coach’s eye” in the mind of the swimmer. This study, along with easily accessible technologies, researches the effects of peer reviewed stroke technique both synchronously, during face-to-face discussion, and asynchronously, online, on a social networking site called Lore.com. If the swimmer can learn, at an early age, to learn to develop personalized stroke technique in themselves and help other peers come to the same conclusion the landscape of future elite level swimmers, may push the boundaries of what the swimming world considers possible right now.

### **Context Literature Review**

Today young club-team swimmers are constantly stimulated by a plethora of activities external to their sport of swimming. These activities include academic pursuits, music, art, hobbies and other athletic ventures. However, beyond the physical and social demands of these activities, they are also engaged in constant social interaction across many platforms, some of which include: text messaging, online gaming, YouTubing and social networking. Adapting to the interaction on these platforms has become essential in order to maintain member engagement, especially that which is external to the time allotted for the given activity. As such, any activity that fails to adapt to these aforementioned methods of interaction will, undoubtedly, become less of a focus for the member causing their engagement to refocus on other events that do. This has become the case of the swim training environment. This warrants the research into methods which will not only maintain but also increase swimmer engagement. It is my belief that the use of social learning technologies, fostered by motivation can increase swimmer engagement which will lead to increased performance. Therefore, this study seeks to explore student motivation, current practices in eLearning and the incorporation of video and audio tools in athletics.

### **Student Motivation**

Within the concept of motivation the studies of a Person-Centered Classroom Management and Person-Centered Support for Athletes will be considered in order to understand the dynamic of the relationship between teacher and student within a classroom setting. This dynamic is relevant to a swim training environment in the sense that the relationship between coach and athlete is similar to that of teacher and student.

#### *Person-Centered Classroom Management*

Person-Centered Classroom Management ( Frieberg & Lamb, 2009) is based on the Person-Centered Theory. This is a theory that strikes a balance between the wants of a teacher and the efforts and needs of a student by forming a collective classroom setting (Frieberg & Lamb, 2009). In order for the collective classroom environment to occur, assert Frieberg and Lamb, there are four conditions that must be present. First, a strong emphasis on the social-emotional relationship between teacher and student. Second, there must be a strong sense of school-connectedness. Third, a positive climate within the classroom and school must occur. Lastly, students must develop self-discipline.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

The social-emotional relationship between the teacher and student is achieved when the teacher demonstrates caring or interest for the student's emotional and social needs as a person (Frieberg & Lamb, 2009). "Students want to know how much you care long before they want to learn how much you know" (Frieberg & Lamb, 2009, p.102). In this role the teacher becomes less of a director and more of an encourager, facilitator and connector. This is essential, according to Frieberg and Lamb, because some students have no interest in learning from a teacher they don't like. By demonstrating this interest in the student, the teacher forms a strong connection between themselves and the students of the class, which can be essential to a student's academic, social and emotional success.

School-connectedness, as mentioned by Frieberg & Lamb, is another essential step in creating a person-centered classroom environment. Students have a want to belong. When a student feels as though he or she belongs they gain a sense of importance (Frieberg & Lamb, 2009). Creating a connection between the student and the school begins with the relationship they form with their teacher. When this relationship has been established and the teacher then shares leadership and increased responsibility with the student, the results are mutually beneficial. According to Frieberg & Lamb, the student feels empowered and the teacher creates more time to teach. By forming this connectedness within the classroom, a positive climate is created.

Another essential condition is that of a positive school and classroom climate. In this climate insults and mockery are not tolerated which leads to the student feeling safe (Frieberg & Lamb, 2009). When the student feels safe, they also feel free to express themselves creatively and demonstrate intellectual curiosity and higher levels of thinking (Frieberg and Lamb, 2009). Overtime, in this freely expressive environment, the student builds trust, not only with the teacher but with the other students in the classroom as a whole. As a result the classroom starts to become a collective. However, Frieberg and Lamb provide one more condition in order for the transformation from a teacher-centered classroom to a person-centered classroom to be complete; student self-discipline must be created.

The fourth and final condition of a person-centered classroom is that of student-self discipline creation. In order for this fourth condition to occur, Frieberg and Lamb, mention in their study one major element that must exist. This element is that the students must be able to make mistakes and learn from them. In order to learn from their mistakes, assert Frieberg and Lamb, there must be responsible consequences. "Responsible consequences" are distinguished from "fixed consequences" in the sense that the student is allowed time to reflect on their behavior in which they consider the mistake from multiple angles. From this a written or verbal apology may occur. This process forms self-discipline (Frieberg and Lamb, 2009).

"Freedom and choice build self-discipline, a necessary foundation for more complex instruction, including cooperative learning, learning centers and independent projects" (Frieberg & Lamb, 2009, p.103).

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

In summary, in order for Person-Centered Classroom Management to occur, according to Frieberg and Lamb, four conditions must be met. These include emphasis placed on the social-emotional relationship between the teacher and student in order to help the student want to learn. As well as the forging of a strong connection between the school and the student, so that the student gains a sense of belonging to something larger than them self. Additionally, a positive school and classroom climate must be created in order to foster trust between the student and the classroom. Finally, student-self discipline must be achieved in order for their motivation to become intrinsic. The sum of these four conditions creates a collective classroom environment which proves mutually beneficial to both the student and the teacher, according to Frieberg and Lamb.

### *Person-Centered Support for Athletes*

Rogers (as cited in Patsiaouras, 2008) asserts that person-centered intervention within a sport setting provides the coach two perspectives of dealing with an athlete. These two perspectives include first, the coach acting as an objectively observing expert without intervening into the life of the athlete. Second, the coach makes personal connections to the internal world of the athlete, which allows them to communicate on a deeper level with them (Patsiaouras, 2008). The key to success of the second approach according to Rogers (as cited by Patsiaouras, 2008) relies on three qualifications: congruence-genuineness, respect-warmth and empathy. Patsiaouras claimed that these three qualities of a coach, were directly linked to the improvement in the athlete, even, without the use of special techniques (Patsiaouras, 2008).

The study conducted by Patsiaouras tested the effects of the person-centered intervention on the motivation of a group of volleyball players. The finding indicated a gender difference.

In terms of gender differences, it was noticed that boys had a tendency anytime they felt it was necessary to use personal discussion compared to girls. The girls preferred to communicate with the coach-researcher with written communication. In total, 20 letters were sent from the girls in the experimental group to the coach-researcher in which they analyzed the problems they confronted and their thoughts...( Patsiaouras, 2008, p.856).

The results of the study displayed by the end of the respective seasons, the boys took first place in their category and the girls moved from the eighth and ninth position into the second. Hence it was concluded that relationships between the athlete and the coach are important and are also connected to game results (Patsiaouras, 2008).

A consideration of the above three studies including Person-Centered Classroom Management, Person Centered Support for Athletes, and the theory of Flow may be relevant to the intended study of swimmer engagement and performance. Especially when the methods employed to create a collective environment, to foster learning, are implemented in coordination with the three qualifications for coach-athlete relationship, which has been proven to enhance an athletes performance, and the theory of Flow which sets conditions for active engagement.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

### **e-Learning in Athletic Education**

In this section the intended study of swimmer engagement and performance is viewed through the lens of current eLearning practices in both education and athletics. The goal is understand methods of eLearning delivery and it's effectiveness.

Using the Internet to deliver instruction, Wright, Stewart, Wright and Barker considered to be either eLearning or distance education. Along with the definition of eLearning, they mention two forms of delivery called synchronous and asynchronous.

*Synchronous delivery* is that which occurs when both the students and instructor meet in real time. Accordingly, this method can consist of lectures, as an in-class experience as well as satellite, broadcast or cable delivery to students situated at remote sites (Wright et al, 2002). Videoconferencing through the use of video cameras attached to computer systems and various chat applications, which allow users to communicate at the same time while connected to the Internet, can also be considered synchronous.

*Asynchronous delivery*, conversely, Wright and colleagues describe as delivery of content that is made accessible at any time anywhere and does not include real-time connection with an instructor. Tools that are useful in asynchronous learning, include compressed video, email and web-based courses.

Their research revealed that according to Kearsley (as referenced by Wright et al, 2002, p. 209), “many users of online instruction do not take full advantage of the Internet’s asynchronous potential”. This finding naturally leads to question: what is the true potential of the asynchronous approach to learning? Wright et al., assert the internet provides the athletic educators many possibilities to offer multimedia content asynchronously. Their summary additionally suggests, athletic training educators must, due to the increase of technology around the world, evaluate methods from which skills and knowledge may be able to be delivered collaboratively with technology.

### **Audio Device and Video Incorporation**

The two previous sections have displayed a series of studies which relate to the significance of the coach-athlete relationship, the classroom environment and the current forms of eLearning within athletics and education. Now I consider the types of tools and practices, with those tools, that can be employed within the swim training environment, in order to effect the engagement and performance of the swimmers.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

### *Use of Audio Device Technology*

Ulf Petter Alexanderson (2009) created a personal training device which uses multi-dimensional spatial audio. According to Alexanderson the concept of spatial audio is not complex.

“If sound waves arriving at the listener’s eardrums are identical to those of a real audio source at a particular positions, the listener will percieve that sound as coming from a source at the particular position” (Alexanderson, 2009, p. )

Spatial audio is being used increasingly often in the computer gaming industry through the use of headphones which reproduce sound that simulates particular environments enhancing the gameplay experience. In the domain of health and fitness, people spend a significant amount of time training. This type of training frequently involves pace-based and interval training. This includes activities like running, swimming and rowing. The problem Alexanderson described as associated with this form of training is that it often leaves the person training on their own, which can lead to less effective training sessions. The specific problems, relative to many pace-based training activities, associated with the training session effectiveness he asserts are losing track of pace. “In view of the aforementioned shortcomings associated with training alone, there is a strong need in the art for a manner in which the training experience may be improved” (Alexanderson, 2009). As a result he developed a device in which the pace training athlete wears a multi-channel headset which is connected to an audio processor. The processor is capable of creating a sound source, when reproduced by the headset, it is “imaged” from two or more locations. As the participant engages in the pace-based activity, the device monitors the pacing of the athlete. Depending on the pace of the athlete, whether he or she maintained a predefined pace, the training device produced a sound that was audibly correlated, relative to the position of the athlete. In other words, when the participant of the study fell off the predefined pace, the invention reproduced a sound that placed the sound being emitted by the device through the headphones in an advanced position relative to the athlete. Likewise, when the participant was ahead of the pace, the sound emitted appeared to be coming from behind the athlete. Still further, the sounds emitted included psychological noises such as heaving breathing and footsteps, or verbal encouragement such as “Keep it Up” or “Let’s go, stay with me.” And these were adjustable so that the verbal encouragement could include more humorous trash talk, such as “My two-year old can go faster than you.”

The point of these methods is that the invention can improve the training experience for a participant. Alexanderson asserts that the invention may enable an athlete to share their experience with other users through the use of a bluetooth transceiver, mobile phone or other devices.

### *Use of Video Training Technology*

According to Brunvand (2010) the ability to capture video is easier with the development of mini camcorders, cell phones and other consumer level cameras. Most new computers are also equipped with software which can create “professional looking video” (Brunvand, 2010).

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

However, what is done with the video is considered less important than why it is done (Spiro, Collins & Ramchandran).

In order to understand why video is done it is important to consider the benefit of video use in training. According to Brunvand, learning occurs when meaning is constructed from multiple representations of similar material. Brunvand, cites research by Lampert which suggests the use of video as a way to share a multitude of perspectives. As an example, in a teacher education environment, videos can display a series of scenarios. Video provides the opportunity to display a teacher dealing with students, teaching complex information and the student's corresponding behavior and will allow them to analyze various situations which they may encounter (Brunvand, 2010). Spiro and his colleagues refer to the videos ability to present complex situations from multiple angles (Spiro, Collins & Ramchandran, 2007). In which case if a single angle presented by the camera proves to be too limiting then the recorder just needs to add another angle. If that is still too limiting then the user can continue to add angles or even additional material not captured on video; commentaries for example. "Video affords ways to catch people's eye and call attention to the often unconscious assumptions they are making" (Spiro et al, 2007, p.4).

In order to draw attention to the unconscious assumptions both Brunvand and Spiro et al make a couple suggestions. Brunvand (2010) suggests that during the initial showing a teacher is not forced to retain all information at once. Rather the teacher can direct his or her attention to different areas of focus each time they view the video. According to Spiro et al (p4) these varying approaches to watching video leads the learner to start to question the past assumptions they have made and this forces them to look deeper into their viewing. As the learner continues to analyze the video they will expect to see more each time (Spiro, Collins, & Ramchandran, 2007).

The study conducted by Spiro et al (2007) suggests a dual part philosophy. The first is concerned with the "underlying ontology of ill-structuredness" (Spiro et al, 2007, p.2-3). Ill-structured domains they define as those environments in which knowledge and practice occur naturally. The second philosophy is characterized as a theory of learning known as Cognitive Flexibility Theory (*CFT*) according to Spiro, Coulson, Feltovich and Anderson (as cited by Spiro et al). "The goal in *CFT* systems is to produce open and flexible knowledge structures to think with in context, not closed structures that tell you what to think across contexts" (Spiro et al, p.4).

Brunvand, references Sweller's cognitive load theory (*CLT*). *CLT* suggests that an individual's working memory has limitations concerning the storage of information. This means that as people watch a video they are unable to retain the information presented. Consequently, video use must be limited to focus on relevant material, in order to hinder the distraction posed by extraneous material (Brunvand, 2010). In order to accomplish this it was recommended that videos are segmented into "specific chapters with audio or text based prompts placed at the beginning..." (Brunvand, 2010, p.251). Another option was that teacher commentary was interspersed like a watching a film with director's commentary. Additionally, it was suggested that videos be created with defined sets of objectives, inserted with hyperlinks, or used in media



## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

sharing sites in order to encourage feedback in comment threads which act as reflections (Brunvand, 2010)

In conclusion, Brunvand (2010) states that it is important to use a variety of design strategies in order for the full extent of the power of video to be used.

### **Summary of Findings**

This review of literature has looked at the contributing factors of student and athlete motivation within a classroom setting, specifically in relation to the Person-Centered Theory. Additionally, it has also taken into consideration forms of eLearning within Athletic education. As well as exploring current practices of video and audio tool use in athletic and classroom environments. It is now the intention to apply what has been learned from Person-Centered Theory to both eLearning and the swim practice environment by using video and audio tools to supplement information instruction in order to test it's effects on swimmer engagement and performance.

### **My Community Context**

My membership at Bakersfield Aquatics Club, a club swim team, is that of Head Age Group Coach. My role is to develop the stroke technique, practice habits, body training systems and racing strategy of the age group swimmer ranging in age from nine to thirteen. Following the time the swimmers spend with me, they will move on to elite level competitions, if they decide to continue to pursue the sport of swimming. Therefore, I am interested in bringing elements of elite level training to the younger swimmer by incorporating the use of accessible technology into the age group training environment. The goal is to help them develop the ability to personalize their stroke technique and connect to a sport that occurs below the water's surface.

### **Research Question:**

Can the use of social learning technology increase a swimming performance?

## **Cycle One Report**

### **Action**

#### *Description*

This cycle investigated the effects of in-person guided peer discussion on swimmer performance. In order to conduct the study, discussions were based on analysis of underwater video recordings taken of six swimmers swimming the fourth competitive stroke, in the order of the individual medley, known as freestyle. In order for this study to explain the relationships between the face-to-face peer discussion, introduction of video analysis and swimming performance this cycle required segmentation into five phases.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

*I did my action research with swimmers that I coach. There were two male students and 4 female students. I coded the swimmers by gender and number.. Therefore, the six participants are coded as M1, M2, F1, F2, F3 and F4.*

### *Research Question*

Will face to face discussion, based on video analysis, increase swimmer performance?

### *Phase One – Making the Underwater Video Recording*

During the initial phase each of the six participants were asked to swim two, 50 yard distances at a heart rate equal to 90% or above, of their maximum calculated heart rate. (*Calculated heart rate is determined by subtracting one's age from 220. The remainder is then multiplied by .9 to determine the required figure.*) The participants then took their heart rate, following their swim, by counting the number of beats in their pulse for six seconds and then multiplying the figure by 10.) The length of time it took each participant to swim both of the 50 yard distances was taken by an observing third party participant, using a stop watch, which I recorded on my iPhone. Each swimmer received a one minute break between the first and second 50 yard distance. The fastest of the two fifties, for each participant, was selected to be used in the video analysis discussion. During their swims I was situated stationary, holding my breath underwater, video recording their swim with my iPhone contained in a waterproof LifeProof Case, only pivoting to record the full span of their swim.

After all six videos were recorded, they were edited into one comprehensive video. Each participant in the video was introduced with the visual aid of a black bar that appeared in the lower left quadrant of their video. On the black bar the participant's coded name was displayed. At the end of their swim their time displayed across the bottom right side of the screen.

Phase one was conducted during the last thirty minutes of two separate swim practices. The first four participants, M1, M2, F1 and F2 were recorded in the first practice. F3 and F4 were recorded two days later during the second practice session.

### *Phase Two - 1st Video Discussion of Swim Tapes*

The second phase, of the first cycle, had the purpose of introducing the edited underwater video recordings to M1, M2, F1, F2, F3 and F4 in video discussion sessions. The video discussion session was held in a conference room equipped with a ceiling mounted projector, computer, internet, audio jacks, dry erase board and a conference table. The participants were released 40 minutes early from evening swim practice so they could change clothes and participate in the 30 minutes discussion session.

On the dry erase board I noted the process for video evaluation and discussed with the group. The process included: 1) Viewing 2) Discussing 3) Recording. Each participant was provided with a pen and a form for recording both discussion points and video analysis of stroke technique (form can be seen [here](#)). The form broke the analysis into four main parts:

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

- 1) Pull: relating to the arms above and below the water's surface.
- 2) Kick: relating to the legs and their motion in and out of the water.
- 3) Body Position: the horizontal and vertical lines of the body in relation to the water's surface.
- 4) Other: Is an area provided to allow any critique that doesn't fall into any of the previous categories or as an additional area for more space for the participant to record.

Once the process for evaluation and discussion was presented the first discussion session proceeded with the analysis of M1's freestyle stroke. M1's video was displayed three times. Each of the three times followed the process of:

- 1) Viewing of the video,
- 2) Discussing the group's critiques of the first swimmer
- 3) Recording their critiques on the form.

After completing the first discussion session, it was determined that thirty minutes session was not long enough to hold an appropriate discussion surrounding stroke technique, including recording, so it was decided, by all participants that an hour would work. As a result of this decision, it was also decided that the participants would still be let out of practice 40 minutes early, however, the additional thirty minutes would need to be granted by the permission of all participants legal guardians. As a result a small discussion was held with their legal guardians, in which an informal agreement was made to hold the discussion sessions until 7pm, for the next meeting.

### *Phase Three - 2nd Video Discussion Session*

The same conference room was reserved for the one-hour second video discussion session. Once the session started the methods of evaluation and discussion were once again posted on the dry-erase board, only this time the participants were advised to read over them, but they were not discussed. Part of the observations made by me, were to see if they would adhere to the same processes as in the first Video Discussion Session process, with minimal instruction.

The session moved at a reasonable pace permitting roughly 10 minutes for each participant's video analysis. A snow storm and road closures made it necessary adjourn early after having completed four more reviews.

### *Phase Four- 3rd Video Discussion Session*

In the time between the 2nd and 3rd Video Discussion Sessions, M1 was transferred to another swim team in town, which meant he would no longer be apart of this study..

The 3rd Video Discussion Session was held in the office of the head swim coach. In the office the participants gathered around the desktop computer of the head coach, in which I inserted a flash drive containing F4's video recording. No mention of the process of evaluation and procedures was made, however, the structure was followed.

F4's video recording, as in the previous two discussion sessions, was viewed three times.

Following each, time was permitted for discussion and recording of stroke technique critique. At

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

the end of the session a date, a week in advance, was made to hold the final phase of Cycle 1, the second video recording session.

### *Phase Five- 2nd Underwater Video Recording*

The second video recording session was set for Saturday, March 30th, in which the first hour of practice would be devoted to recording the freestyle swimming of M2, F1, F2 and F3. F4 was unable to attend.

As in the first video recording, in phase one, each swimmer was expected to swim two, fifty yard distances in the stroke of freestyle. The swimmers were asked to swim each of the distances at ninety percent of their maximum heart rate as before. In between each of the distances the swimmer was given a one minute rest period. During their swim the time was recorded as before and video was made in the same way.

## **Evaluation**

### *Data Collected*

Data collected during this first cycle included twenty two underwater video recordings, four for each participant, with the subtraction of two given M1's team transfer. Twelve of these recordings were taken for the first video recording session. The final ten were taken at the end of the cycle during the second video recording session. During the three phases of Video Discussion, thirty six discussion forms were intended to be collected, however only thirty five forms were collected as a result of M1's transfer. In addition to these pieces for analysis, observations were made and recorded in multiple blog posts.

### *Method of Analysis*

In order to answer the question set out for this first cycle of this action research, several levels of analysis were required in order to gain insight into the action which was the target of this study; will face to face discussion, based on video analysis, increase swimmer performance? What follows are those steps of analysis. They include: first, recording the length of time it took each swimmer to swim a fifty yard freestyle sprint. Although each swimmer swam two fifty yard distances, the fastest of the two fifties were used in this study for each participant. Second, the technical stroke critiques received from each participant about each of the other members was recorded. Third, each swimmer was evaluated based on the number of critiques they received against the number of those critiques, they were actually able to change in their stroke. Lastly, a second set of times were recorded during a second video recorded fifty yard freestyle sprint. The second set of recorded times were then compared against the participants initial fifty yard freestyle times. The results will then be analyzed to detect any correlation between the decrease or increase in time and the number of changes made based on the peer critiques.

### Swimmer Speed Times

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

The first step of analysis required timing the length of time it took each participant, during the first video recording session, to swim a 50 yard distance. The initial set of times is depicted in Table 1.1 below.

Table 1.1

<b>Participant Code</b>	<b>1st Video Recording Session: 50 yard Freestyle Time</b>
M1	34.2 secs
M2	29.4 secs
F1	37.6 secs
F2	33.8 secs
F3	31.3 secs
F4	32.6 secs

### Analysis of Peer Critiques

The second step of analysis required taking the 35 forms, filled in by the participants during the three discussion sessions, and analyzing them to determine, for each of the six participants, which critiques had the highest frequency relative to each swimmer. (Highest frequency in this case, was determined to be those critiques which were said by more than 16% of the participants.)

Table 1.2:

M1 received eight separate critiques. Table 1 shows the number of swimmers who noted each of them.

<b>Critique</b>	<b>Number of Swimmers Noting Critique</b>
Arms Cross Center	2
Arms Cross Too Much	2
His arms go straight down	2

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Critique	Number of Swimmers Noting Critique
Leg is bending too much	5
Head needs to be lower	2
His body moves side to side	4
Head moves too much	2
Needs to be straighter	2

Table 1.2 depicts the critiques given to M1 and the number of participants who gave the various critiques. Two participants gave the critiques including Arms Cross Center, Arms Cross Too Much, His Arms Go Straight Down, Head Needs to be Lower, Head Moves too Much and Needs to be Straighter. Four of the six participants agreed that M1's body Moved Side to Side. However, the majority of participants, five of six, agreed that M1's Legs were Bending Too Much.

Table 1.3

M2 received three separate critiques. Table 1.3 shows the number of swimmers who noted each of them.

Critique	Number of Swimmers Noting Critique
Needs to rotate/ role more	3
Knees bend too much	6
Head needs to be lower	6

Table 1.3 displays the three most frequent critiques given by the participant group to M2. Three members said that he Needs to Rotate More. All six participants agreed that M2's Knees Bend too Much and Head Needs to be Lower.

Table 1.4

F1 received eight separate critiques. Table 1.4 shows the number of swimmers who noted each of them.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Critique	Number of Swimmers Noting Critique
Arm Cross Center	6
Elbows Bend too Much	3
Knees Bending Too Much	2
Pointing Toes on Right Foot	2
Legs Move like Butterfly	2
Head too High	3
Body Shifts	3
Body in Alignment	2

Table 1.4 depicts the most frequent critiques made for participant F1. F1 had a total of eight critiques. The least frequent made by 33% of the participant group included Knees bend too much, Needs to point her toes on her right foot, Legs move like butterfly kick and Needs to keep her head in alignment. Slightly more frequent at 50% agreement among the group was that F1's Elbows Bend too much. Next at 83% agreement was Her body shifts. Most frequent, however, both at 100% were Arms are crossing center and Head is too high.

Table 1.5

F2 received three separate critiques. Table 1.5 shows the number of swimmers who noted each of them.

Critique	Number of Swimmers Noting Critique
Pausing before she takes a stroke	5
She stabs the Water	4
Kneeds bend too much	3
Feet Need to Point	3
Head lifts up to Breath	2

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Critique	Number of Swimmers Noting Critique
Head is too low	2
Needs to Rotate More	4

Table 1.5 shows that F2 received the critiques of Head Lifts up to Breath and Head is too Low from two participants respectively. Three participants each gave her the critique of Knees Bend too Much and Feet Need to Point. Four of six participants agreed that F2 Stabs the water with her arms and that she Needs to Rotate more.

Table 1.6

F3 received eight separate critiques. Table 1.6 shows the number of swimmers who noted each of them.

Critique	Number of Swimmers Noting Critique
Pausing in her stroke	4
Arms Crossing Body	3
Arms Bending in Water	2
Knees bend too much	4
Too much wiggling from side to side	2
Head needs to be lower	3
Has good rotation	2
Head needs to be down	4

Table 1.6 presents eight critiques given by the participant group to F3. Of the six participants, two agreed, in each critique, that F3 Has Good Rotation, Wiggles too Much from Side to Side, and Arms Bend in the Water. Three participants agreed that her Arms Cross her Body and that her Head Needs to be Lower. Additionally, three critiques received a majority of agreement from the participant group, each being said by four of six participants. These included Head Needs to be Down, Knees Bend too Much and Pausing in her Stroke.

Table 1.7



## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

F4 received seven separate critiques. Table 1.7 shows the number of swimmers who noted each of them.

Critique	Number of Swimmers Noting Critique
Arms cross center	5
Legs bend too much	3
Has scissor kick	2
Rotation is wobbly/ crazy	2
Upper body rotates more than lower	2
Rotation needs to improve	5
Head lifts up too high	2

Table 1.7 displays the type of critiques given to F4 by the participant group and the number of said group who also stated the same critique. Two members of the group gave the critiques of Head Lifts Up too High, Upper Body Rotates More than Lower, Rotation is Wobbly/Crazy and Has Scissor Kick, respectively. Three participants agree that F4's Legs Bend Too Much. Two critiques also received agreement from five of the six participants saying her Arms Cross Center and her Rotation Needs to Improve.

### Comparisons between the first and second sessions.

The second video recording session for each of the five remaining participants, was analyzed to determine the changes made by each participant to their freestyle against the total number of critiques of high frequency, made for each participant, by the group. These corrections were then annotated and displayed on each participants second video recording. These videos can be seen [M2](#) , [F1](#) , [F2](#) , [F3](#) and F4.

### Table 1.8

The six participants each received a varying number of critiques from within their group. Each participants was also able to change a varying number of those received critiques. Table 1.8 displays, for each participant, both the number of suggested changes and those they were able to change. In the case of M1 and F4, both participants were unable to record a second video, therefore, no point of comparison could be made. As such a status of non-applicability is applied to the right handed column for each swimmer.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Participant Code	Number of Suggested Corrections	Number of Corrections Made
M1	8	n/a
M2	3	2
F1	8	2
F2	6	5
F3	8	6
F4	7	n/a

### Improvement in Speed

The times taken during the second video recording, for each participant, during their second 50 yard freestyle swim were compared against the times taken during the first video recorded session. The goal was to discover if there would be a time increase or decrease, for each participant, in how long it took them to swim a fifty yard freestyle after having received peer critiques of their stroke.

Table 1.9

Displays, for each participant, the times recorded during their first video recording session and second, as well as the difference between those recorded times.

Participant Code	First Video Recording Session Time	Second Video Recording Session Time	Time Improvement (in seconds)
M1	34.2 secs	n/a	n/a
M2	29.4 secs	29.0 secs	0.4 sec
F1	37.6 secs	36.4 secs	1.2 sec
F2	33.8 secs	32.0 secs	1.8 sec
F3	31.3 secs	31.0 secs	0.3 sec
F4	32.6 secs	n/a	n/a

### *Findings*

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

This first cycle sought to discover the effects of peer discussion, based on video analysis and its effects on swimmer performance. In order to determine the answer to this question several elements from my data analysis must be put together in order to explain the reasons behind the answer. These two elements will be drawn from Tables 1.8 and 1.9. In specific, to find the answer, a comparison must be made between the number of corrections a swimmer was able to make based on the critiques they received and the amount of time increased or decreased from one video recorded session to the second.

Initially it might be thought that the swimmer who made the most corrections would naturally have the largest time drop. Conversely, it might be said that the swimmer with the least amount of corrections made would have the least time drop. However, this is not always the case, as the findings of this study depict.

Both M1 and F4's results will not be considered for this study as they were both unable to be video recorded a second time. Therefore, based on the design of this study, they did not have a second recording from which the first could be repaired. As such this study proceeds with the analysis of M2, F1, F2 and F3.

M2 was able to make two of the three corrections that were presented to him by the group. From the first video recorded session to the second he improved his time a total of 0.4 of a second. In this case, he was able to change a majority of the critiques he received, however, he had the second to lowest amount of time drop among the group.

F1, unlike M2, made the least amount of corrections among the group. Having received eight critiques, she successfully made two corrections. However, she had the second largest time improvement among the participants at 1.2 seconds.

F2, ended up making the most corrections of any member of this study. She was able to make five corrections of the six she received. Additionally, she had the largest time drop of the group at 1.8 seconds. In this case, the most corrections made did in fact have the largest time improvement.

F3, had a significant amount of corrections made to her stroke. F3 changed six of eight critiques she received. However, she had the lowest time improvement of the group at 0.3 of a second.

These results lead to the questions: What do the result mean? Secondly, does face to face discussion, based on video analysis, increase a swimmers performance?

Given the results depict that the quantity of changes made by swimmers do not necessarily equate to significant time improvement, other factors need to be considered when reviewing the study. First and foremost, the type of correction being made, may in fact have a greater impact on time than the quantity of corrections occurring. Meaning, certain corrections may in fact, help the swimmer to gain greater distance when moving through the water, at faster rates, than other

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

corrections. In these cases the corrections made would have a much stronger impact on the swimmer's recorded time. Additionally, the age of the swimmer, may be a contributing factor to the amount of time improvement one can experience in this study. The two swimmers who dropped the most amount of time within the group, F1 and F2, were also the youngest. M2 and F3 are older than F1 and F2.

Lastly, does face to face discussion, based on video analysis increase a swimmers performance? Based on this study, all participants who completed the cycle from start to finish improved their fifty yard freestyle time. This evidence supports, within this small study, that any critique received from a peer in a face to face discussion, when corrected by the swimmer can help to improve their swimming performance.

### **Reflection**

When reflecting on the actions and results of Cycle 1 I am dividing my reflection into three sections. First, I will consider possible reasons and causes for results. Second, I will reflect on my decisions and how I could improve on my approach. Third, I will consider how these reflection propel me forward into Cycle 2..

When reviewing the results of this study I want to reflect on the many factors that may have had a part in the results that I analyzed. I was expecting to see a positive correlation between the more common critiques which were voiced by the swimmers's peers and their application to stroke improvement. However, that turned out to not be the case. While reviewing the 2nd Video Recording Sessions, it became instantly apparent to me that there would be no such correlation. Whether a critique was offered by all of the swimmers, or by only one of the swimmers, the swimmers appeared to be making modifications spanning the whole spectrum of critiques. Naturally, this result made me consider what the other factors were present that could contribute to this very diverse result. These would include an increase in training, stronger relationships, illness, as well as ego.

Given the timing of Cycle One, significant time drops may have occurred as a result of an increase in training during that time period. At the start of the cycle, although all of the kids were not coming off of a break, they were all coming out of a taper. Taper, being the point in season where we decrease the yardage and increase speed work, in hopes of allowing the swimmer's body to work on race pace swimming, while allowing their muscles to recover over less time period, which will allow their energy resources to gain so that they can unleash it at their main meet. The goal of course, is that through each season the increase in work would be displayed at this time period. Due to tapers decrease in yardage, the increase in yardage shortly following, during Cycle One may have helped the swimmer to prolong their taper and drop time during the video recording sessions. This is a questionable point, however, because it is very unlikely they would've been able to prolong taper for a four week period. This then led me to question the impact of stronger relationships among the groups participants. It is possible that it was not what was said as much as who said it.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

At the start of the cycle two of the swimmers were dating, however shortly after starting the study the relationship ended and another appeared to be starting. Where there was beginning relationship, a male students was more intent on critiquing the swimmer he was socially interested in than in any other swimmer. Additionally, certain members of the female half of the study have stronger and more developed relationships with one another than some of the other participants. This may have made any of these participants more inclined to listen to the critiques of their friends over those they have less of a relationship with.

Other factors that may have hindered the performance of any participant was the fact that a couple of them had been ill during the study. Illness during the study would cause certain members like M2 and F4 to miss a couple of workouts. By missing a couple workouts this would've caused them to have less time to work on correcting various critiques they had received. M2 and F4 were those participants who had missed a couple of days during the study. F4, had been out for a while ill.

Another simple reason why corrections may not have been made comes down to the swimmers perception of the individual giving the critique. Given the nature of the in person discussions, it is apparent to the participants which among them first suggest a correction to be made. It is possible that should the swimmer receiving the critique not perceive the participant critiquing their stroke to be a valid source of criticism, the critique could be ignored.

While examining swimmers stroke improvement, I also turn and ask the same question of myself, how can I improve my coaching? That improvement was at the heart of this study. One of the most difficult parts of this cycle was the coordination of meeting up for our discussion sessions. At each discussion session I was hoping to provide each participant with a solid group of individuals to critique their strokes. As such, when someone was absent or on Spring break, it made it incredibly difficult to execute the social part of this study in a timely fashion. As such the discussion sessions where held over a large portion of time and sometimes with two weeks in between. Additionally, I think a huge benefit that comes during the first cycle comes at the end. This was, of course, the annotation of video. I believe that the swimmer would gain a huge benefit from seeing the annotated video. However, I would definitely want the critique to come from their peers. So, considering this leads me into my final part of this reflection...how will moving forward be approached?

Cycle 2 will switch to the stroke of breaststroke. Two main factors will come into play with this cycle that I have indicated as challenges during this one. First, the second cycle will use the social networking site called Lore.com to give the participants an asynchronous setting in which to critique each others strokes. This will require me to provide them with a timeline to make the various critiques. Hopefully this will condense the amount of time it takes to receive all critiques for participants. Once all critiques have been mentioned, my intention is to then annotate the videos based on those critiques, so that the second video recording session of cycle 2 can be reflected against the first annotations.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Overall, however, I am very excited at the fact that all swimmers that participated through the entire length of this study improved. I believe this will go a long way towards incorporating video use and potentially other technology into the training environment.

In conclusion, I believe the social aspect of stroke analysis is important and carries with it the power to help swimmers improve and gain education about the sport. Often the coach is perceived to be the sole resource for the athlete on the deck, especially in a sport that is primarily spent with your face in the water in solitude. However, to teach the swimmers not only how to swim but also the why and about swimming in general, can help facilitate a community of swimmers in which questioning, sharing and reflecting about various stroke techniques will not only help them improve as individuals but as a team as well.

### Cycle Two Report

#### **Action**

##### *Description*

Cycle Two dove into the effects of peer based review, based on video analysis, on the social networking site name Lore.com, on swimmer performance. In order for this study to be conducted, it was necessary to peer below the surface and analyze swimming with the use of underwater video recordings of five competitive swimmers. The stroke that was used for this second cycle, for all five swimmers, was the third stroke in the order of the Individual Medley known as Breaststroke. In order for the effects of peer review to be connected to the results of this study, it was necessary to segment the cycle into five parts.

*My second action research cycle, just as my first, included five of the six swimmers whom I coach. There was one male swimmer and 4 female swimmers. I coded the swimmers by gender and number.. Therefore, the six participants are coded as M2, F1, F2, F3 and F4.*

#### **Research Question**

Will peer review, asynchronously posted on Lore.com, based on video analysis, increase swimmer performance?

##### *Phase One- First Video Session*

Similar to the first cycle, the second required the participants to swim two, fifty yard distances. When swimming the two distances the swimmers were asked to get their heart rate up to 90% or above of their maximum calculated heart rate. In between each fifty yard distance they were given one minute rest. During their fifty yard swims I positioned myself in the middle of the pool, underneath the water and held my breath as they swam in order to record a video of the participants swim with my iPhone. The swimmer, who followed them, meanwhile, stood on the pool deck and recorded the time it took each swimmer to swim their fifty yard distance with a stopwatch. The fastest of each swimmers two swims was used for editing and critiquing purposes, and would be transferred to the social networking site, Lore.com

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

### *Phase Two- Lore.com*

Unlike the first cycle, this cycle did not use synchronous face-to-face meet-ups in order to generate group discussion. Instead asynchronous discussion held in a secure social networking site, called Lore.com, was used. In order for each of the five swimmers to participate on Lore.com, I had to create a swimming course, include objectives and then invite each of the five participants into the network. Once the swimmers accepted my invite they were free to create their own personal profiles. Concurrent to their profile creation, I edited and then posted, in Lore.com, the first video recording for each of the swimmers second cycle. The swimmers were then given a week to record the critiques of themselves and their fellow group members on Lore.com. As the participants posted their comments, I would then ask questions, based on their comments, in an attempt to provoke them to dive deeper into the reason they think the swimmer should make a change to their stroke based on his or her critique. The comments each participant made in the comment threads were then annotated on the first video session.

### *Phase Three- Video Annotate and RePost*

The third phase of cycle two, included taking all comments that had been posted on the five comment threads in Lore.com, following the video posts of the swimmer's breaststroke recordings. The received critiques were then placed onto individual spreadsheets depending on who the critique was meant for, and were also separated by both the participant who made them and which part of the stroke the critique could be categorized in. These categories included:

- 1) Pull
- 2) Kick
- 3) Body Position
- 4) Other

After the critiques had been recorded and separated onto the spreadsheets, the iPad application, Coach's Eye, was then used to audibly and graphically annotate the various critiques, for each of the five participants. Each annotation was recorded without my opinions and input, but rather based off of the comments that had been received from the participant group.

Following the annotation of all five videos, the new annotated videos were posted onto Lore.com and the participants were given a week to view the video and attempt to make any modification to their breaststroke.

### *Phase Four- Second Video Session*

After a week had passed, following the posting of the annotated videos, M2, F1 and F3 were recorded for a second time in cycle 2. Once again, as in phase one, they were required to swim two, fifty yard distances of breaststroke. The participants were once again asked to swim the two distances at a heart rate that equalled 90% of their maximum calculated heart rate. I was stationed in the middle of the pool, underwater, with my iPhone in a waterproof case. The participant, who followed the swimmer acted as the time recorder, timing the swimmer with the use of a stopwatch. The swimmers were given a minutes rest between their two fifty yard distances. The fastest of their two times were used for editing, annotation and posting.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

### *Phase Five- Video Comparison*

During the fifth and final phase of cycle two, the videos recorded during the second session of M2, F1 and F3 were compared to the first video recordings using the Coach's Eye application for iPad. The second videos were then analyzed against the first video for similarities and differences in the participants stroke technique based on the critiques each swimmer had received. In addition to differences in stroke technique, a difference in elapsed time was also noted. The video comparisons were then posted to both Lore.com and socialswimming.weebly.com.

### **Evaluation**

#### Data Collected

Data collected during cycle two included fourteen video recordings, four each for three of the participants and two for a fourth participant. The fifth participant was grounded from practice during the length of this cycle and consequently missed the video recording sessions. In addition to the video recordings four separate spreadsheets with over twelve cells of recorded peer critiques was created. Multiple reflections over several blog posts were created. Additionally, four times were recorded for each swimmer indicated the time elapsed during their fifty yard sprints, bringing it to a total of fourteen recorded times. Seven of these times were recorded in the study.

#### Method of Analysis

##### Step One- Establish Baseline Time

The first step of analysis in the second cycle, as in the first, required recording an initial amount of elapsed time based off of each participants swimming fifty yard breaststroke. Table 2.1 below displays the initial times recorded for each participant in seconds per minute.

Table 2.1

Participant Code	Video Session 1
M2	39.51
F1	49.08
F2	41.8
F3	40.08
F4	Absent

##### Step Two- Analysis of Peer Critiques from Lore.com

The second step, in order to analyze the data collected in this study, required recording in a table format each critique received by the five participants. In addition to consolidating the critiques, the number of participants noting the critique was also indicated.



## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Table 2.2

M2 received two critiques. Each of the critiques were focused on the motion of his legs during his breaststroke swim. The first was that his “kick looks small” and the second mentioned “his knees are coming forward too much”. Both of the critiques were indicated by a single member of the participant group.

<b>Critique</b>	<b>Number of Swimmers Noting Critique</b>
His kick looks small	1
His knees are coming forward too much	1

Table 2.3

F1, as depicted in table 2.3, received a total of four critiques from the participant group. Each of the four were mentioned by a single participant, respectively. The four critiques F1 received included: “Knees should point in”, “She needs to bring her hips up”, “Her kick isn’t simultaneous”, “Needs to stop bobbing”. Two of the four critiques mentioned dealt with the position of her legs while breaststroke kicking, while the other two centered on the relation of her body position to the surface of the water.

<b>Critique</b>	<b>Number of Swimmers Noting Critique</b>
Knees should point in	1
She need to bring her hips up	1
Her kick isn’t simultaneous	1
Need to stop bobbing	1

Table 2.4

F2 received two critiques from the participant group, each indicated by a single participant, as displayed in Table 2.4. The two critiques she received included: “She is doing a weird thing with her right leg after she kicks”, “She also needs her legs to close more”. The two critiques received focused on the use of F2’s legs while committing her breaststroke kick.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Critique	Number of Swimmers Noting Critique
She is doing a weird thing with her right leg after she kicks	1
She also needs her legs to close more	1

Table 2.5

In the table below the critiques received by F3 are recorded. F3 received a total of four critiques, each respectively indicated by a single member of the participant group. Three of the four critiques centered around the use of her legs in breaststroke, while the other focused on the depth of her body position underneath the waters surface. In the critique “She puts her legs outward like this ^ they need to be like this ||” special characters were used to graphically indicate F3’s leg position. Other critiques received included: “Brings her knees up instead of just bending them”, “Kick is big” and “Going under the water too far”.

Critique	Number of Swimmers Noting Critique
She puts her legs outward like this ^ the need to be like this	1
Brings her knees up instead of just bending them	1
Kick is big	1
Going under the water too far	1

Table 2.6

The table below indicates no critiques received from any participant due to F4’s absence during the two video recordings. Table 2.6 is displayed, however, in order to show congruence between cycles, as F4 was present in all three cycles.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

<b>Critique</b>	<b>Number of Swimmers Noting Critique</b>
Absent	N/A
Absent	N/A

### Step Three- Video Session Comparisons

The third and final step of Cycle Two's data analysis included comparing three results obtained during the study. The first, compares the number of suggested corrections to the number of corrections actually made by each swimming participant. The second comparison is that of the elapsed times recorded in the first video session to the times recorded during the second video session, and noting the difference. Finally, the third comparison involves putting the aforementioned comparisons together into a single table and noting the relationship between the amount of time dropped to the amount of changes made to the stroke, based on participant biofeedback. These comparisons are shown in the following tables: Table 2.7, Table 2.8 and Table 2.9.

Table 2.7

Below, Table 2.7 illustrates the total number of corrections made compared to each of the participants received suggested corrections. M2, as shown, received a total of two suggested corrections. Upon review of his second video session it was discovered that of the two suggested corrections, M2 had made one change based on the feedback of the participant group. F1, during her first video session, received a total of four suggested corrections. Following the review of her second video session, it was found she had made one correction of the four suggested. Next, F2 had received two suggested corrections, however was absent during the second video recorded session and consequently was unable to have any changes to her stroke recorded. F3 received four suggested corrections and made no corrections to her stroke. Lastly, F4 was absent during both video recorded sessions and as a result did not partake in cycle two.

<b>Participant Code</b>	<b>Number of Suggested Corrections</b>	<b>Number of Corrections Made</b>
M2	2	1
F1	4	1
F2	2	Absent
F3	4	0

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Participant Code	Number of Suggested Corrections	Number of Corrections Made
F4	Absent	Absent

Table 2.8

The table below displays each participant's elapsed time difference between the first video session and the second. M2, recorded a time of 39.51 seconds during his first video session and a time of 39.90 during his second. M2, as a result gained .39 of a second between his first and second recordings. F1, posted an initial time of 49.08 during her first video session. During her second, 49.70 seconds marked the time posted upon completion of her second video recording. F1 added .62 from the first video recording session to the second session. F2 posted a time of 41.80 seconds during her first session, however was absent from the second video recording session. F3, however, swam her first fifty yard distance in a time of 40.08 seconds, and during her second video session posted a time of 39.80. F3's second time was a drop of .28. F4 was absent from both video sessions and therefore, did not have any time recorded.

Participant	Video Session 1	Video Session 2
M2	39.51	39.90
F1	49.08	49.70
F2	41.80	Absent
F3	40.08	39.80
F4	Absent	Absent

Table 2.9-Correction to Time Comparison

Table 2.9 displays the number of corrections made by each study participant in relation to the amount of time either added or dropped between video session one and video session two. M2 having made one of two corrections added .49 of a second to his swim between the first and second video sessions. F1, added .62 of a second to her 50 yard breaststroke after making one of four corrections. F2, was absent during the second video session and consequently was unable to post a time as a follow up to her first video recorded session, which meant no time difference or correction modifications could be noted. F3 having made no corrections of four suggested dropped a total of .28 seconds to her 50 yard breaststroke between video sessions. F4 was absent during Cycle 2, and therefore recorded no data.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Participant	Number of Corrections Made	Time Difference Between VS1 and VS2
M2	1 of 2	+. 49
F1	1 of 4	+.62
F2	Absent	Absent
F3	0 of 4	-0.28
F4	Absent	Absent

### **Findings**

The intent of Cycle 2 was to discover if peer review, based on video analysis, asynchronously posted on Lore.com, would increase swimmer performance. In order to answer this question it was necessary to consider specific results collected during the study. These results include the difference in elapsed time between the first video session and the second video session. Additionally, the number of corrections made by each participant compared to the number suggested. Finally, it was essential to correlate the amount of time added or decreased to the number of corrections actually made by each participant in order to correlate any relevance to stroke modifications, based on peer review

Originally, the hypothesis proposed was that an asynchronous form of peer review, in which the participants could comment at their leisure would prove to be more beneficial than the synchronous face-to-face discussion, tested during Cycle 1, and consequently swimmer performance would increase. However, as the results of this study display, asynchronous forms of communication are not always utilized to their full potential, resulting in a decrease in performance.

Following the first video session, once all videos were posted and annotated on Lore.com, of the twelve total critiques received three fourths focused on the use of the participants legs during their breaststroke swim. Additionally, one-fourth of the received critiques were concerned with the swimmer's body position and none mentioned the movement of the arms during breaststroke pull. Considering the potential areas to critique in a swimmer's stroke, for the majority, only one third of those areas was heavily critiqued by members of the participant group; that area being the kick. Each of the twelve critiques was only mentioned by one participant, respectively. This result indicates a low level of critique diversity by each participant.

After the completion of the second video recording session, the elapsed time from the session could be compared against those times recorded during the first session. Considering two of the five participants had been absent from the second video recording session, it meant that only three were able to fully complete Cycle 2. Of those remaining three, two of the swimmers, M2 and F1, added .49 and .62 of a second respectively. M2 having received two total critiques, was

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

able to modify his breaststroke to accommodate one of the two critiques. F1, having received four total critiques was able to modify her breaststroke to make a single critique. Regardless, of making a modification to their stroke M2 and F1 both added time. Although the results from M2 and F1 proved that just because a critique is adapted to a stroke, doesn't mean time will drop, F3 results were different. F3 made no modifications to her stroke, based off of the participant critiques, however of the three participants in this cycle, she decreased her time in the fifty yard breaststroke by .28 of a second.

In conclusion, will peer review, asynchronously posted on Lore.com, based on video analysis, increase swimmer performance? The findings of the Cycle Two study indicate that asynchronous involvement on Lore.com was low. As a result of low involvement fewer critiques were received by each participant when compared to the amount received in Cycle One. Additionally, M2 and F1, although having modified their strokes based on group critique did not improve their times, indicating that peer review of stroke technique does not always develop performance improvement. Finally, F3, having made no corrections to her stroke, based on user feedback, improved her performance. This suggests that making no changes may prove to increase performance rather than adapting to group review.

### **Reflection**

Given the results of this study, it is necessary to focus on specific areas contained within the method of analysis. When I question what could be done differently next time, my thoughts center around the suggested critiques received by each participant in this study, especially considering the amount received and the amount posted. Based on my observations and the feedback I received from the participants I contribute the low level of feedback to technological limitations, lifestyle accommodation and lack of structure

Each person in the study, of the critiques they received, each critique was said by only one person. The feedback I received, from the participants, indicated this could be attributed to several factors. These factors included being grounded and having been sick. However, my observations also add on another factor to their two; technological limitations. These limitations were present in all five participants, including the two whose attendance prevented them participating in Cycle Two. These technological limitations refer to 1) a lack of hardware to access the internet in the household 2) For those that had internet access, there was a single device which the whole family used. As a result, this severely limited both the amount of time the participants could spend on Lore.com, and their ability to access it in different locations was compromised. Consequently, the participants responded less and were unable to spend a significant amount of time on Lore.com. However, the fact Lore.com was new also played a part in their use of it.

Posting the annotated videos on Lore.com had a great deal of potential for asynchronous activity. However, the fact that Lore.com wasn't an established part of the participants lifestyle also had

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

an impact. Unlike Facebook or texting, Lore.com was not a social network which had become a part of their daily lives. Not to mention, considering the small size of the participant group, the majority of their friends were also not on Lore.com, but on Facebook. This meant, that when given the option, of where to spend internet time, it was where their friends were. This also reduced the amount of time spent critiquing the video session on Lore.com

Lastly, I considered the overall structure provided in Cycle 2. In comparison to the first cycle, Cycle Two lacked the instruction given concerning the method of stroke analysis. In Cycle One, the participants were each provided a form which, in many ways, broke down into various areas how to critique a stroke. These areas included: Pull, Kick, Body Position and Other. However, as previously stated in Cycle Two three-fourths of the critiques focused on kick and the motion of the legs for each participant. A lack of critiques in the other areas of the stroke, meant there were less options for the participants to make changes to. Additionally, if certain participants could adapt certain critiques easier to other areas of the body, the corrections they made off of feedback in this cycle would not have consider those adaptations.

Therefore, it remains how to move forward. In cycle three, it will be essential to have a device accessible for those participants who have limited internet access. In addition Lore.com will continue to be used, but with a way to provide clearer structure in reviewing stroke technique.

### Cycle Three Report

#### **Action**

##### *Description*

Cycle three was, like Cycle One and Cycle Two were, immersed in the study of the effects of peer reviewed stroke technique. Where cycle one examined peer review from a synchronous face-to-face set up and cycle two splashed into the environment of online social networking with the use of Lore.com, Cycle Three intended to further the study of peer review with the use Lore.com by taking the results gathered in Cycle Two and making adaptations to the approach. As such, Backstroke, the second swimming stroke in the order of Individual Medley was chosen. Cycle three, in order to test the effects of peer review, as laid out by this study, it was necessary to segment the cycle into five phases. The overall purpose of Cycle 3 and the aforementioned segmentations follow.

*My third action research cycle, included four of the original six swimmers, featured in cycle one, whom I coach. There was one male swimmer and 3 female swimmers. I coded the swimmers by gender and number. Therefore, the four participants are coded as M2, F1, F3 and F4.*

##### *Research Question*

Will peer review, asynchronously posted on Lore.com and based on video analysis, increase swimmer performance with the addition of a structured method of analysis?

##### *Phase One: First Video Session*

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Cycle three, similar to the two previous cycles, required the members of the participant group to swim two, fifty yard distances. Where the previous cycles included the strokes of freestyle and breaststroke, this cycle utilized backstroke. Each of the two fifty yard distances was swam, by each participant, at 90% of their maximum calculated heart rate. In between each fifty yard distance the swimmers were given a one minute rest, in order for their heart rate to lower before they increased it on the second fifty. During each of the two fifty yard swims, I was positioned in the middle of the pool, underneath the surface of the water holding my breath as I recorded their swim with my iPhone, protected from the water in a LifeProof Case. In order to record the time for each backstroke sprint (sprint a swimming term, defined by high paced effort over short distances) the other participants were asked to record the times, using a stop watch, of the swimmer who swam before them. Once all swims were captured on video, and all times were recorded, the fastest of the two swims, for each swimmer, was used to post onto the social networking site Lore.com.

### *Phase Two: Introduction and Lore.com*

Similar to the two previous Cycles, the fastest fifty of stroke, recorded on video, by each participant was posted on Lore.com. However, unlike the previous cycles, Cycle 3 included a video introduction, which was the first video posted that served as a reminder to the group of the areas to consider when analyzing stroke. This video was referred to as the method of analysis video. The areas it covered included:

- 1) Pull
- 2) Kick
- 3) Body Position
- 4) and Other

In addition to the method of analysis video, each posted video included, in its comment thread, a reminder for the reviewer to watch the method of analysis video before critiquing the swimmers stroke. The next phase would need to gather the data, based on the biofeedback given on each comment thread.

### *Phase Three: Video Annotation*

Following the second phase, all comments made critiquing the various participants backstroke were collected and separated onto several spreadsheets. The critiques were placed in one of four categories including: Pull, Kick, Body Position and Other. All four categories were duplicated into individual spreadsheet per coded participant name. Additionally, all comments were posted on the spreadsheet separated into rows depending on who made the critique. Once all critiques were collected the recording from the first video session, was annotated using an iPad application titled Coach's Eye. The video annotations included both audio voiceover explaining the critiques, as well as graphics overlay which visually depicted using lines, arrows and circles the critiques being discussed. Each annotated video was then posted on Lore.com for the participants to review. In Cycle Three each participant was instructed to indicate in the comment thread of their video, they had watched it. The swimmers were then given one week to watch the video before they were recorded for the second video session.



## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

### *Phase Four: Second Video Session*

After several weeks had passed, due to various absences as a result of both illness and end of year school activities, the second video recording session of Cycle Three occurred. Similar to the first video session the swimmers were asked to swim two fifty yard distances, of backstroke, at a heart rate equal to 90% of their maximum calculated heart rate. Inbetween each fifty yard sprint, the participants received one minutes rest. I was positioned in the middle of the pool, holding my breath underneath the surface, and video recorded their sprints with my iPhone in a LifeProof case. In order to record the amount of time that elapsed during each swim, the participant who would follow the swimmer, was once again positioned, standing on deck with a stopwatch timing the sprint. All recorded times were input into a spreadsheet containing the times from the first video session. The video recording of the fastest fifty yard distance swam, by each swimmer, was kept and used for video comparison.

### *Phase Five: Video Comparison*

Once all videos were recorded for each swimmer, the videos were edited to include the participant code and the cycle's title, set over a black gradient bar in the lower left hand corner of the video. Each of the participant's video was then annotated using the iPad application, Coach's Eye, against the critiques received in the first video session. All four videos were then annotated based on changes made based on the performance displayed in the first video session. A separate spreadsheet recorded the suggested corrections and actual corrections made. This spreadsheet, will later be used as an essential part of the performance evaluation.

## **Evaluation**

### *Data Collected*

The data collected in cycle three included: fifteen critiques, pulled from comment threads on Lore.com, were broken into individual spreadsheets, one for each participant, and further placed into categories such as kick, pull, body position and other. Additionally, sixteen videos were recorded and annotated for each participant. Two for each of four swimmers during video session one, and two for same participants in video session two. Lastly, a total of sixteen times were recorded a total of four for each participant. However only the fastest time from video session one and the fastest time posted in video session two was used for each participant.

### *Method of Analysis*

In order to analyze the data collected during this study, to correlated it to the research questions posed by cycle three of: Will peer review, asynchronously posted on Lore.com and based on video analysis, increase swimmer performance with the addition of a structured method of analysis? The analysis has three steps. The steps are First Video Recording, Peer Review Analysis and Final comparisons. These steps are detailed below.

### *Step One- First Video Recording*

Similar to the two previous cycles, the first step in Cycle Three's method of analysis was to establish a baseline time for each of the participants. Below, Table 3.1 displays the amount of time elapsed for each of the four participants during their fifty yard backstroke swim.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Table 3.1

Participant Code	Video Session 1 Time
M2	32.7
F1	40.32
F3	39.78
F4	35.2

### *Step Two- Peer Review Analysis*

Below Tables 3.2 through 3.5 display data collected, for each participant, during the second phase of this study. The information displayed in each table includes: The critique received, the total amount of swimmers -within the participant group- noting the critique and which part of the stroke the critique is noting.

Table 3.2

M2, as displayed in table 3.2, received four critiques. Two of the critiques received were noted by a single participant each, while the other two were remarked by two participants. Of the four received critiques two of them focused on the “Pull” section of stroke, one on “kick” and the other on M2’s “body position”.

M2		
Critique	Number of Swimmers Noting Critique	Area being Noted
His legs need to straighten more	1	Kick
He needs to bend his right elbow more	2	Pull
His elbow needs to bend more	2	Pull
He is looking down to far	1	Body Position

Table 3.3

The following table displays the critiques received by participant F1. F1 received a total of three critiques. Two of the critiques were each noted by two swimmers, while the third critique was

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

said by a single participant. Each of the three received critiques fell into a different stroke area. One was said for each of the areas including kick, pull and body position.

<b>F1</b>		
<b>Critique</b>	<b>Number of Swimmers Noting Critique</b>	<b>Area being Noted</b>
Her knees are bending too much	2	Kick
She needs to bend her elbows more.	2	Pull
She's not rotating enough.	1	Body Position

*Table 3.4*

F3 received five critiques, as displayed in Table 3.4. Three of the five received critiques were said by one participant each. Additionally, one of the five was mentioned by two of the participants. The fifth critique was mentioned by three of the four participants. Of the five critiques three focused on the body position of the swimmer, and one each centered on the kick and pull.

<b>F3</b>		
<b>Critique</b>	<b>Number of Swimmers Noting Critique</b>	<b>Area being Noted</b>
Her knees are bending too much	3	Kick
She is letting her right arm sweep very far out before she bends her elbow	1	Pull
When rotating, she stops and rotates again.	1	Body Position
She isn't rotating enough	1	Body Position
She needs to lift her head up more.	2	Body Position

*Table 3.5*

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Table 3.5 displays the critiques received by participant F4. F4 received a total of three critiques to her backstroke. Two of the three critiques were mentioned by two other members of the participant group, while the third was said by three. Each of the critiques commented on a different area of stroke focus. One of each of the three critiques centered on kick, pull and body position.

<b>F4</b>		
<b>Critique</b>	<b>Number of Swimmers Noting Critique</b>	<b>Area being Noted</b>
Her knees bend too much	2	Kick
She needs to bend her elbows more	3	Pull
She needs to rotate more	2	Body Position

### *Step Three- Final Comparisons*

In this third and final step, tables 3.6 through 3.9 display a series of comparison used to analyze the data collected during this study. These comparisons include: A stroke category comparison between cycle 2 and cycle 3, a comparison of critiques received versus corrections actually made, time comparisons between the first video session and the second. Lastly, table 3.9 compares the number of critiques corrected by each swimmer to the amount of time dropped.

### *Table 3.6- Categories by Cycle Comparison*

The following table depicts the number of critiques given between cycles two and three, based on the method of analysis given in cycle three. As displayed in table 3.6, participants in cycle two gave a total of twelve critiques. Of those twelve 75% of the critiques were concerned with the “kick” category and 25% were centered on the “body position” category. Cycle three received a total of fifteen critiques. 33% of the critiques received fell into the “pull” category. 27% of the received critiques placed in the “kick” category. The category of “body position” contained 40% of critiques given.

<b>Category</b>	<b>Cycle 2</b>	<b>Cycle 3</b>
Pull	0	5
Kick	9	4
Body Position	3	6
Other	0	0

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Category	Cycle 2	Cycle 3
<b>Total Critiques</b>	12	15

*Table 3.7 Critiques Suggested vs Critiques Made*

Depicted in the following table is the comparison of critiques given to each participant compared to the actual number of critiques actually corrected to their stroke between video session one to video session two. M2 was able to correct two of four critiques given. F1 corrected two of three, F3 one of five and F4 one of three. Finally, of the fifteen critiques given six were actually implemented. This figure totals 40% of critiques made.

Participant	Number of Suggested Corrections	Number of Corrections Made
M2	4	2
F1	3	2
F3	5	1
F4	3	1
<b>Total</b>	<b>15</b>	<b>6</b>

*Table 3.8 Time Comparisons*

Table 3.8 displays the difference in elapsed time between the fifty yard swims between video session one and video session two for each of the cycle three participants. Displayed below, M2 dropped .23 seconds, F1 lowered her time by .17 seconds, F3 time dropped .08 of a second and F4 added .09 of a second to her swim. This total indicates that 75% of the participants decrease the amount of time elapsed between video session one and video session two.

Participant	Video Session 1 (Time in Seconds)	Video Session 2 (Time in Seconds)	Time Difference
M2	32.70	32.57	-0.23
F1	40.32	40.15	-0.17
F3	39.78	39.70	-0.08
F4	35.20	35.29	+0.09

*Table 3.9 Actual Corrections Made vs Amount of Time Dropped*

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

The following table, 3.9, displays the comparison, for each participant, between the actual number of corrections made to the time difference in their fifty yard swim between video session one and video session two. Table 3.9 shows that M2, having made two corrections to his stroke decreased his time by .23 of a second. F1, making two corrections, lowered her time by .17 of a second. F3, also lowered her time by .08 of a second after having made one correction. F4, also made one correction and added .09 of a second to her second fifty yard backstroke swim.

Participant	Corrections Made	Time Difference
M2	2	-0.23
F1	2	-0.17
F3	1	-0.08
F4	1	+0.09

### **Findings**

The intent of this cycle three study, aimed at increasing the potential for swimming performance improvement by adding a structure method of analysis to the question: will peer review, asynchronously posted on Lore.com and based on video analysis, increase swimmer performance? In order to generate the findings of this study it was essential to consider several factors. These factors included a category by cycle comparison, a comparison of critiques suggested to those actually made, time comparisons between video session one and two. Lastly, the number of corrections made needed to be compared to the recorded time difference between video session one and two for each participant. The following are the findings of these comparisons.

A category by cycle comparison was used to test the effects of a structured method of analysis between cycle two and cycle three, especially concerning the diversity of suggested critiques. “Diversity” in this study refers to the suggested critiques falling into one of four stroke analysis categories; meaning kick, pull, body position and other. The results indicated that in cycle two of the twelve critiques received 75% were concerned with the motion of “kick” within each of the swimmers strokes. Cycle three indicated that of the fifteen critiques received 27% of the suggestions referred to the “kick”. The category of “body position” in the second cycle found that 25% of the twelve critiques fell into this section. Cycle three, in comparison, found that 40% of the fifteen critiques fell into the “body position” category. Cycle three also indicated that 33% of the critiques suggested were placed into the “pull” category, which cycle two received no suggestions in this category. Both cycles displayed no critiques that were placed into the category of “other”. Based on the result displaying an increased in diversity between suggested critiques between cycle two and cycle three, the next step was to analyze the difference between the suggested critiques to the total amount actually change for each participant.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Next, a comparison of critiques suggested to changes actually made would indicate, within the timeframe of this study, the total number of critiques each participant actually changed to their stroke. The data here can be found on Table 3.7 and was generated from observations made between video session one and video session two. The findings indicate that M2 was able to make two corrections of four. F1, was able to make two of three potential changes. F3 made one change based on the five corrections she received. Receiving three critiques, F4 made one change based on what was suggested. The findings are that of the fifteen critiques suggested on Lore.com, the participant group combined to make a total of six corrections. This is equal to 40% of the corrections being used to change their strokes. The next, step involved comparing the differences in time between the two video sessions of this cycle.

The purpose of comparing the time differences for each participant between video session one and video session two was to track any decrease or addition of elapsed time between the participants two fifty yard backstroke swims. The results were that M2 decreased his time by .23 of a second. F1 dropped .17 of a second and F3 lowered her time by .08 of a second. Lastly, F4 added .09 of a second to her time. In order to further understand the relationship between the amount of time dropped, one potential reason involved the number of corrections made to their stroke. Hence, it was necessary to compare the number of corrections each participant made to the amount of time dropped during the third cycle.

Data collected when comparing the actual number of changes each participant made to their stroke, based on suggested critiques, to the amount of time decreased or increase to their backstroke fifty yard swims between video sessions indicates the following: M2, after making two adjustments to his stroke decreased his time by a total of .23 seconds. F1, additionally made two corrections to her backstroke based on the biofeedback she received and dropped .17 of a second to her time. In addition F3 made one change to her backstroke and dropped her time by .08 of a second. However, F4, after making a single change to her backstroke, like F3, added .09 of a second to her fifty yard swim. Therefore, what does this data mean?

The data collected during this cycle indicates several results. First, the provision of a structured method of analysis for stroke technique increased the diversity between the areas mentioned during peer review of the participant's stroke technique, potentially providing, the swimmer receiving the critique, with multi options for adaptation to their stroke. This may increase the potential for improvement, given the participants ability to change various areas of their stroke technique. Second, considering the amount of suggested critiques to changes actually made, indicates the group is able to suggest 60% more critiques then they are actually able to modify in their strokes. This either indicates a difficulty in the ability to modify stroke technique over a week-long period, a lack of wanting to make changes or the complexity of understanding physically how to translate suggested critiques into stroke modifications. Third, considering the correlation between number of changes made to the amount of time dropped or added, displays that the higher the number of changes made to the stroke, based on peer review, the greater the amount of time drop and hence improvement. Conversely, the fewer changes made, based on

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

peer review, the less time improvement will occur, if an improvement occurs at all, it may also increase time elapsed during a fifty yard swim as evident in F4.

In conclusion, asynchronous peer review on Lore.com, based on video analysis and aided by a structured method of analysis did increase swimmer performance as evident in 75% of the participant group.

### **Reflection**

The findings of cycle three indicate to me three major points of reflection. First, the effect of providing a structured method of analysis. Second, seeing an increase in participation on Lore.com. Third, the lack of suggested critiques that could be considered under the category “other”.

I think the most successful part of this cycle had to do with providing a structure method of analysis. As results indicate, providing a structure method of analysis, clearly made the diversity of the participants suggested corrections increase. I believe this contributed to the improvement, for 75% of the group by highlight various areas that each individual can work on in order to improve their stroke. For example, if M2 is proficient at modifying critiques that are based on the motion of his arm, he will undoubtedly make more corrections to his stroke. On the other hand, if the only critiques he received are focused on the motion of his legs during kick, and he has a difficult time making modifications to his legs, his chances of modifying his stroke become more limited. In this sense for each swimmer to have a more diverse set of critiques to consider has proved to help the swimmer improve their performance.

In order to improve the structured method of analysis, I would modify the way the videos are recorded. Instead of recording one pivotal video from underneath the water, I would next record videos specific to the areas mentioned in the structure method of analysis. The areas are kick, pull, body position and other. For example, in order to generate more biofeedback related to the kick, I would take a video in which I follow the swimmer and primarily focus on the legs in the video. For pull, I would follow their arms and for their body position I would record video of them out of the water, as well as under the water and I would also diversify the angles from which I recorded the videos.

The result of this study, encourage me towards the benefit of asynchronous peer review on a social networking site such as Lore.com. In fact, the increase in the number of suggested critiques as well as the number of participants saying them, shows me that during this cycle the participants spent more time on Lore.com. Additionally, it also displays that for those who had difficulty using technology in cycle two, found ways to get onto Lore.com and participate. Not to mention I feel highly encouraged because this was done asynchronously, which means that when they were away from the pool they were thinking about swimming and, in specific, stroke technique.



## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

If I were to improve the participation, I would actually like to build an application myself, that could be used between OS, Android, etc. I believe that a mobile application is the most accesible option for a group of age group swimmers. A majority of them use smart phones, and for those that dont, could easily sign in through the use of their friends. These would be available to them even while they are still on the pool deck. Another way I would attempt to improve the participation on a social networking site, would be to invite more swimmers into it. The reason for this is simple, people go where their friends are. The friendship between swimmers who spend hours a day at a pool together, needs no concern. However, to include more swimmers in the study, I think would prove to entice them more to participate in a social network.

Lastly, I would like to consider the lack of suggested critiques to the category “other”. This indicates to me a lack of miscellanous commenting. While the categories of kick, pull, body position are dominating and easily apparent, they are not sufficient. I believe that the lack of comments that fall under the “other category” indicate a lack of out-of-the-box considerations to stroke technique. This to me indicates, additionally, a lack of personalized stroke correction suggestion. While it is true the critiques said were personalized to the individual, the majority of comments made are still evident of the common thread of critiques one hears from their coach, rather than critically thinking about developing new critiques, I am concerned we are hearing regurgitations.

In order to improve this last concern, may mean that I, as a coach, need to develop a better practice of challenging my swimmers to consider diversity when critiquing stroke as well as encouraging them to not be afraid of questioning elements of their peers stroke based on physical factors.

Overall, I am very please with how cycle three turned out. After cycle two I was concerned that asynchronous peer review would not work...however, I just had to realize that like in face-to-face discussion, as in cycle one, in order to socialize on a network, specific to a given topic, clear guidelines set the parameters and establish the language that will be used in the environment.

### **Final Reflection**

After being immersed below the surface during this study, points of reflection have become clear now that I have had the chance to dry off and look back at the results. These points of reflection, from which I have learned, come to four. These four points are concerned with the results of this study, personal introspection, organizational observations and lastly a significance on a scholarly level.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

### **Reflecting on the Results of this Study**

The results from this study, *Seeing Below the Surface: How Technology Can Make Coaching a Shared Experience*, have allowed me to consider a couple of results. First the importance of providing diverse stroke technique critiques. Second, in order to provide a diverse array of critiques it is important to provide a structured method of stroke analysis.

Over the span of the three cycles a total of sixty seven critiques were given by the participants. Of those sixty seven critiques, sixteen were concerned with the “pull” of the stroke, twenty-four with the “kick”, eighteen were directed at “body position” and nine fell into the category of “other”. These figures are relevant to this study when looked at within the realm of their respective cycles. For example, during cycle one, a total of thirty-nine critiques were given by the participants. Cycle one’s diversity in stroke technique commenting was evident in that: eleven were about “pull”, ten were concerned with “kick”, nine focused on “body position” and nine, also, could be categorized into “other”. During cycle one, fifteen, or thirty eight percent, of the critiques were corrected meaning four of the six participants improved their times. Four of six participants obviously, isn’t one hundred percent, however, two of the participants were absent during the second video session of the cycle, therefore only four actually completed the cycle, from start to finish. Making one hundred percent of the participants who finished the cycle improve their times. In order to also note the importance of stroke technique critique diversity, cycle two and cycle three must also be considered.

At the beginning of cycle two the participants noted, in each other, a total of twelve critiques. This total was significantly lower than that received in cycle one. Of those twelve received critiques only two, or seventeen percent, were modified within the members’ strokes. However, the two modifications did not prove beneficial to the participants, because the two participants who each made one modification based on the peer review to their strokes, added time to their swims. During this cycle it was participant F3, who made no adjustments to her stroke who ended up improving her swim. So, why did stroke modification not help the participants? Although there are many potential reason, one very apparent reason is, of the twelve critiques given ten of them, or eighty-three percent, were directed at “kick”. Should a participant only receive a critique of an element of their stroke which they either don’t need to correct, or correct incorrectly the critique could prove to be counter intuitive, as was the case with M2 and F1

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

during cycle two. These results begged the question, how to increase a diversity in stroke analysis? Cycle three attempted to answer this question.

During cycle three a grand total of fifteen critiques were received. This number is still lower than cycle one, but higher than cycle two. Additionally, of these fifteen critiques, six, or forty percent were actually adapted into the participants strokes. The results displayed that three of the five participants improved their times during their swim. *(In this cycle please note that one of the five participants was absent. This actually meant that four participants completed the cycle three study from start to finish, which also meant that three of four participants improved their swims.)* Therefore, why were more swimmers able to improve their times? Like in cycle two, many answers could be present, however one difference from cycle two, and in alignment with cycle one, was a diversity in the critiques of the stroke technique received. Within cycle three of the fifteen total critiques received, five were “pull” targeted, four were directed at “kick” and six were focused on “body position”. This result lends itself to be interpreted that a diverse array of stroke technique critiques provide the swimmer with multiple options to correct increasing the chance they have to make proper modifications to their stroke, to help them improve. The question remains though, how to approach generating a diversity in stroke technique critiques?

To answer the aforementioned question, it is important to deduce the differences between the three cycles. The answer is the following: cycle one provided the swimmers with a form to fill out, helping direct their critiques to many diverse areas of stroke technique to consider when making their critiques. In cycle three, knowing this, a video containing a method of analysis was displayed to each participant. Cycle two, however, did not provide a clear structure to critiquing stroke technique, which, as indicated in the result, meant that eighty-three percent were directed at a single area. Hence the answer to the question, lies in providing a clear structure for a method of stroke analysis in order to receive diversity in the critiques given.

### **Personal Introspection**

Diving into this study, changed a lot more than the swimming strokes of my participants, in many respects it also changed my coaching methods, how others perceive me and how I perceive myself.

As a result of this study, and seeing the importance of a diversity within stroke technique critique, when I comment on the strokes of my swimmers I now spend a great deal of time, each

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

practice, informing them of multiple areas I believe they should considering working to correct. However, in addition to making sure to provide the swimmers with a variety of options, I also no longer dictate to them, what they need to do, rather, by thought provoking inquiring, I drop an initial thought into their ear, which then ripples over the surface of their thinking. ( This is clearly indicated by the increase in questions and feedback of ideas I receive from my swimmers, which is higher after having done this study than it was previously.) As a result the communication between myself and my swimmers has increased, as has the topic of stroke technique. These changes have not gone unnoticed by those who I don't coach. Consequently these have also caused others to take notice of my coaching strategy.

Through observation, I have noticed swimmers from other groups, their parents and other coaches paying attention to what I am saying and what I am doing with my swimmers. In fact, one parent, of a kid in a younger group, came to me and said "My son, cant wait to move up to your group. He saw you in the water with your swimmers the other day and thought that you seemed like a 'cool coach'". Upon hearing this, I asked the parent, why she thought her son thought that of me. Her response was that I seemed like a coach who wasnt scared to try something new and keep it interesting for those I coach. Although, in previous years I have received compliments from parents, the majority were directed at my enthusiasm and personality. Since changing my methods, as a result of this study, I now hear more critiques directed at what I am doing as a coach and what the swimmers are learning. As a result of feedback, such as that previously mentioned, I have also come to see myself in a different way.

Since this study, I have changed the perspective of myself. Previously, I often considered myself to be the coach, who had a significant amount of success in his own swimming career, who loved the sport, and could offer great advice to those he coached. However, this often left the swimmers in awe of my accomplishments. The select few, with more determined personalities, would decipher that "if coach Matt could do it, I can too." However, that being said, since this study I have now transitioned into being the coach, who is "on the same level" with those he coaches. As a result the kids have become increasingly comfortable to be around me and make mistake, and they have also been more intrigued to ask me about my opinions of their stroke and of the swimming superstars who inspire them. Essentially, I have come to view myself as a mentor. In the role of mentor I am committed to the success of my swimmers performances, but also increasing their knowledge about everything swimming related and how it pertains to life.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Not to mention, I also work with my swimmers to make sure I am not the only resource during practice, and I encourage them to rely on each other for support and information.

### **Organizational Observations**

Back paddling out of the introspective reflection, observations have also been made pertaining to the organization in which I coach. From efforts of my action research study I have noticed changes to other coaches within the organization, swimmers and their parents.

Coaches, like teachers, bring something individual and unique to their classroom or the pool deck as the case may be. Since the coaches have seen my effort in underwater recording the participants of my cycle studies, there has been an increased interest for me to record swimmers from other groups, as well, and hold discussion sessions. As a result of these inquiries, for the first time on my team, I see collaboration beginning to happen in the actual training environment between coaches. Rather than the coaches wanting to continue to hoard their own techniques for their specific training groups, an initial effort has been made to have me work with the swimmers of other groups. Should we proceed to work, as coaches, with each others' swimmers, I believe that a long term result could become a coaching collaborative. A collaborative could provide for our swimmers a diverse practice curriculum composed of the varying groups of swimmers, segmented by age, being coached by a team of coaches rather than one at a time as they age. I believe this could lead to a swimmer with a very rich understanding of stroke technique, race strategy and training understanding.

Although, the impact I have seen my study have on the coaches within my organization, the greatest influence as been on the swimmers who partook in my study. Normally at a swim meet the coaches sit along one side of the competition pool, stationary, as they watch each swimmer race. The swimmers are typically required to talk to their coach before and after their races. However, the four participants from my study, who remain on the team, often spend their time, during a meet, sitting on the deck next to me. Without any provocation, these four swimmers will critique the strokes of the swimmers racing in the water, often pausing to ask me my thoughts on how the swimmer of their focus is swimming. As a result, we often dive deep into the discussion of stroke technique and why individualized stroke technique may be important. However, I am not the only person who has noticed this change in this small group of swimmers, the parents of this group and of other kids not involved in the study have noticed too.

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

Since starting the study, the parents of the participants have commenting to me that stroke technique has “clicked” with their swimmer. Often noting that on the car ride home after practice their young athlete will inform them of things they need to work on, in order to improve. In some cases the parents have even informed me that their swimmer has posted their goals on a display board in their bedroom at home. However, they are not the only parents commenting on the change in the swimmers attitudes. Since completing the study, a parent of a child, who I coach, and was not involved in the study approached me and asked, “Are you going to work with the rest of the group like you did with those kids, after your research is done?” To this I replied, “Yes.” The parent then proceeded to say, “Oh, that is good. Cause all of those kids have been improving and their strokes are looking better. I want my kid to do the same.” This indicates to me an appreciation for the work that has been done, the results of that work and a willingness to welcome it into the lives of other kids. As such, I have learned that extending the study is of interest to others.

### **Scholarly Level**

The final area that I wish to reflect upon has to do with the broader picture. The effects of my work and its importance into the field of action research. While many studies have promoted the need for communities of practice, I believe that my study promotes it in a new area, age group competitive swimming. In order to express my point further, two points must be considered. First, teaching the swimmer to consider their peers as resources and second, for the coach to be among the athletes and not above them.

The importance of my action research, and its largest contribution, comes in the form of developing a community of practice within the age group competitive swimming environment. Often, like the classic lecturing professor, the coach is often the focal point of a practice environment. Typically, the swimmer arrive at practice to be told “what to do” and “how to do it” by their coach. However, hopefully with the proven benefit of peer reviewed stroke technique, coaches can help their athletes understand that their teammates are also resources from which they can refer and contribute. As I have said this would be most influential in the age group competitive swimming environment.

Lastly, in order for the age group environment to become a community of practice, it is necessary for the coach to become more than a lecturer. The coach needs to help the athlete develop into a critical thinker about their sport and the challenges that arise within competition. In order to do

## TECH IMPACT ON MAKING COACHING A SHARED EXPERIENCE

this the coach must collaborate with the swimmer and not command the athlete. Only through a process of mutually interactive discussion can the results for the swimmer clearly become individualized.

In conclusion, the impact of Seeing Below the Surface: How Technology Can Make Coaching a Shared Experience, extends itself not only to this action researcher, but to the organization, in which I coach, and it's members. Additionally, the results of this study can be followed by other action researchers and improved upon. Truly making coaching a shared experience.

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