

# Distance Coaching: Is It Viable to Improve Motor Learning Using The Internet?

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## Abstract

This paper will review coaching at a distance as it is today. How motor learning skills are best learned will be discussed along with advances in computer and Internet technology. Traditional coaching methods at a distance have not changed with the available technology. Distance coaching format should be altered to accommodate the new advances that are available in the electronic media.

## Introduction

In the past athletes have always had to move to be with a coach. A fine example of this is Mike Smith, Canada's top decathlete. After completing his high school athletics career in Kenora, Ontario, he decided to train as a decathlete and stay in Canada instead of accepting a scholarship to an American School. Mike moved to Toronto and trained with Andy Higgins. Working with Andy, Mike set the Canadian record in Decathlon. After Andy retired from coaching, Mike had two unsuccessful years training on his own, he eventually decided to move to Calgary to work with Les Gramantik. Donovan Bailey who lives in Toronto moved to Texas to train with Dan Pfaff prior to the 1996 Olympics is another example of an athlete who moved to work with a coach. Athletes have always moved to be with their personal coach. This is how most athletes are coached, face to face.

However, there are some athletes who have opted to be coached at a distance. Catherine Bond-Mills, the Canadian Record Holder in the Heptathlon lives in London, Ontario, last her coach is was Les Gramantik who lives in Calgary. Two Saskatchewan athletes, Carla Baker (Regina) and Vanessa Monar-Enweani (Saskatoon) are also coached at a distance by Les Gramantik. Mike Zimmerman who lives in Regina coaches Rod Tolbert, a sprinter, who lives in Jacksonville, Tennessee. Olivia Yuel is still coached by her coach from Edmonton despite moving to Saskatoon a year and a half ago. John Fitzgerald of Rosthern coaches Jason Warick of Saskatoon. Each of these athletes has chosen to be coached at a distance.

Distance coaching in athletics is not a new concept. Olympian, Cyprian Enweani, from Saskatoon, was coached at a distance in the early 80's by John Cannon in

Calgary. Cyprian was in High School and wanted to be coached by John Cannon. Workouts were sent by mail, the occasional phone conversation and some face to face workouts. However, distance coaching today has not reached the same level of advancement as distance learning in our educational systems. In our education systems today, we have distance education that is synchronous and asynchronous along with courses over the Internet. No longer is distance education just a correspondence course. Currently none of these new methods of delivery have widespread use in distance coaching. Coaching at a distance is still done at in an asynchronous mode with the workouts prescribed in advance with no alteration during the workout. There are many that disagree with coaching at a distance and that motor skills should not be coached at a distance.(Sanderson, personal conversation, February 22, 2001, Gramantik, personal conversation, February 24, 2001, Pallesen, P., Haley, P., Jones, E., Moore, B., Widlake, D. and Medsker, K., 1999) With today's technology, this attitude could change.

### Motor Learning

Learning muscle movement is a complex task. Initially when learning the skill, there is a large cognitive component to make the muscles move in the pattern trying to be learned. Once the pattern is learned, the movement can be reproduced without much cognitive effort.

Lyle Sanderson and Jim McClements(1998) offer the following recommendations in steps that should be undertaken in skill development.

In high level performance it is what the athlete feels (image of action/kinaesthesia) that is most important when learning a skill. In the initial stages of learning, it is important that the athlete be given clear

instructions and that an appropriate model of the desired skill execution be provided through demonstration and other means.

A sound learning progression that leads to the correct positions and movement patterns is very important in developing and enhancing correct skill execution. The focus of both coach and athlete must be directed at the skill element being worked on. A questioning technique that requires the athlete to tell the coach about the execution helps the athlete focus attention on the skill element being emphasised.

Many trials of the correct execution will help the athlete to internalise the kinaesthetic feeling associated with proper technique and to develop the new motor program. When modifying a skill with an experienced athlete, the athlete must be committed through an understanding of the benefits of the change. The athlete must understand that change leads to "what feels right is wrong and what is right will feel wrong."

When the athlete achieves correct execution and the cue is given, the coach must give that athlete the time to internalise the feeling. It is a mistake to interfere with learning by giving technical feedback while the athlete is to internalise the kinaesthetic of correct execution. Devices that provide objective immediate feedback in a normal training environment can be powerful tools in helping the athlete develop a skill.

To clarify their final statement on correct execution, the cue given would be a simple "yes" or "good". This will give the athlete confirmation that what they have just done is correct. Milliseconds after the completion of correct execution make a large difference in the retention of the newly learned skill or change of technique of a skill. Lyle Sanderson(personal communication, February 19, 2001) After the performance and the simple positive execution cues, the coach needs to be silent and allow the athlete to internalize the correct execution.

During the teaching of the skill feedback should always be given during the practice session Abernathy(1991) agrees with Sanderson ,“Provide the opportunity for the greatest number of practice-trials-with-feedback possible.“

However, there are opponents to giving the athlete immediate feedback. Richard Schmidt and his colleagues suggest that immediate feedback could be detrimental to the retention and the learning of a motor skill. The suggestion is that immediate feedback does not allow the learner to internalize what has just occurred in the last trial if the feedback is given immediately. If the learner is allowed to think about the last trial and feedback is given a few minutes later, the learner brings in the cognitive component of learning the motor skill. Schmidt's (Lee, Swinnen & Serrien, 1994) study showed that:

In these cases, the learner becomes too reliant upon the augmented feedback to correct movement errors. For example, the provision of instantaneous feedback during practice tends to detract the learner from interpreting intrinsic sources of feedback, such as vision and proprioception. Schmidt suggests that it is these sources of feedback that one must learn to interpret since they will always be available to the learner. Augmented feedback (such as the feedback received from a teacher) will not always be available (e.g., during a game). Indeed, the goal in most learning situations is for the learner to become independent of the teacher. Learning to rely upon the information provided by these people will ultimately be detrimental to achieving independence.

One of Schmidt's colleagues gives a different perspective on feedback.

Swinnen (Lee, 1994) believed "that encouraging subjects to estimate their augmented feedback produced a benefit to learning beyond that achieved by simply delaying the instantaneous provision of the feedback. This suggests that the cognitive effort in attempting to learn to interpret one's own intrinsic feedback, in combination with augmented feedback, can be a potent influence on learning. Augmented feedback might be most beneficial to learning when it serves to augment the cognitive efforts in learning self-evaluation skills using the sources of information that will be available during competition."

Both Sanderson and Schmidt agree that there is a cognitive component to motor learning. They also agree that feedback is important in learning a motor skill, but there is some disagreement in when the feedback should be given.

## Technological Considerations

The Internet is rapidly becoming the way to transfer information quickly around the globe. We are in the information age and there are many ways in which one can be connected to the World Wide Web. Although there are many choices, one needs to know the advantages and disadvantage of each system and the availability of the connection, which may be considered.

### Satellite

Satellite Networks can link the athlete with the coach and provide both audio and video with high quality. However, there are many technical issues that would have to be overcome. Getting the camera equipment and televisions to the training site and having the equipment to send the signal to the satellite. The crew running the technology would be large and the costs enormous. Using a satellite system would bring the athlete and the coach together in a synchronous coaching situation, but this would be uneconomical.

### Conventional Telephone Line

The Bandwidth on a POTS (POTS-Plain Old Telephone Service) system is limited to 3khz. Using sophisticated techniques such as frequency key shifting, phase key shifting and quadrature amplitude modulation more than 3khz of bandwidth has been made available using a telephone line. Today the industry standard is a 56k modem for POTS, which actually only transmits 48k of data in ideal conditions. This is the slowest of all of the types of Internet connection today. The cost for a conventional telephone line connection varies depending upon the amount of hours purchased from your Internet provider. Usually the cost is less than \$30 for 50 hours of service per month.

### Integrated Services Digital Network (ISDN)

An ISDN Internet connection consists of a pair of copper telephone lines instead of a single telephone line. Information can be carried at 144kbps, which is more than two times faster than a conventional phone line. A problem with ISDN is that the further away your connection is from the source, the slower the speed of the information. Cost for an ISDN line is similar to that of a conventional phone line.

### Digital Subscriber Line (DSL)

DSL also uses the same phone lines, but the speed is near 1.5 Mbps. Digital information is carried on the wire, which comes into your home, and your phone line can be used at the same time your Internet connection is on. Your telephone line is carried at a frequency between 400hz and 3.4 kHz. The digital signal for the Internet is carried at frequencies above 4 kHz. A simple bandpass filter is used to separate the two signals coming into your home.

However, the biggest problem with DSL is that the further you are away from the source of the Internet provider, the lower the speed of the line. The limit for DSL from the origin of the telephone service is just over 5 km, beyond this distance the signal is too weak. The reason for this is that amplifiers on the phone lines do not work on digital signals and the further you are from the source, the lower the quality of the signal. Because of the distance problems with DSL, it is not offered in many rural sites and is sold only in larger urban centers. The higher speed that DSL offers costs between \$50-\$70 for a full-time connection per month.

### Cable Modem

Each television station is given a bandwidth of 6 MHz (6Mbps) on a coaxial cable line, instead of a television station; the Internet information is carried on this channel. Information can travel at between 30-40 Mbps on a coaxial cable. However, the problem with cable modems is that the more users that are online, the slower the service because all users are sharing the same channel. The price for a full time cable modem connection is similar to that of DSL.

### T1 Line

Modern Fibre optic cables makes up a T1 line. A single fibre optic line can carry 64kbps; a T1 line is made up of 24 fibre optic cables and can carry 1.544 Mbps. The intended use for a T1 line is for the modern office. The cost of a T1 line connection between \$1,000 - \$1,500 per month.

### Wireless Internet

Currently wireless Internet technology is not fast enough to handle fast data transmission rates. The wireless technology is available on cellular telephones, but the data transmission is text only.

## Using the Internet for Coaching at a Distance

There are various methods in which information from a practice may be transferred from one site to another. Video of an athlete can be sent over the Internet in asynchronous distance coaching, or videoconferencing methods such as, CUseeMe or Picture Tel could be used for synchronous coaching.

## VideoConferencing

### PictureTel

The PictureTel system transmits voice and video to other locations by digital telephone lines and provides interactive audio and video in both directions. Early Picture Tel systems were set up permanently in conference rooms and a technician was required to operate the system. Today the systems are much less demanding to use, less expensive and portable. Currently, Picture Tel sells a Picture Tel Video 550 pci card and Flip camera for less than three thousand dollars, which can be attached to a home computer. The system offers video of up to 30 frames per second and can be used over the Internet.

### CUseeMe

CUseeMe software allows people to video chat over the Internet in an inexpensive manner. (Barker, 1994-95) The actual use of CUseeMe is for videoconferencing or video chat. Instead of the typical indoor conference between individuals sitting in front of their computer, the coach will watch the athlete perform and be able to interact with the coach immediately after the performance.

Video requires a bandwidth of approximately 100kbps. A 28.8 Kbps or 56 Kbps would not be fast enough to carry the video portion of the signal since the video would not be fluid. A high speed Internet connection is not required, but the higher bandwidth of a high-speed connection would make the video portion more fluid.

The Audio portion is not required for watching the athletes' technical aspects of a workout, but when the athlete or coach wants to communicate verbally to the other, this portion of CUseeMe is needed. Sending audio and video simultaneously takes up a large amount of bandwidth.

CUseeMe also gives the option of full duplex or half-duplex modes. In full duplex mode one can send and receive sound simultaneously, which is similar a telephone conversation. Half-duplex mode allows one to receive or send sound, but not both simultaneously; this is similar to speaking on a walkie-talkie or CB radio. By using the half-duplex mode, clarity of the audio is increased since there is a greater bandwidth for the audio portion.

By using this technology, we are trying to achieve a face to face coaching situation. CUseeMe is a very complex program accomplishing the coding and decoding multiple audio and video signals which is intensive work for the CPU and all other hardware within the system. The cost of high speed computers has dropped dramatically in the last 2 years. Today one can purchase a PIII computer for under \$1000.00 and this would be more than enough computing power to run the software for CuseeMe.

### Methods of Coaching

#### Face to Face Coaching

This is the most common method of coaching athletics. Almost all athletes in athletics are currently coached by this method. Feedback can be given immediately and

there is interaction with the athlete and the coach constantly during a practice session. Coaches and athletes in this situation may still use technology to enhance the training, but it is not a requirement.

### Asynchronous Coaching

Asynchronous modes of coaching do not require both parties to be communicating at the same time. Extensive hardware and technical support are not needed to be coached by this method. It is far less expensive than being coached in synchronous mode. Many athletes already take part in some form of asynchronous mode of coaching. It is rare to find a coach to be with their athlete at every competition today. A preplanned week of workouts away from your coach or phoning a coach from a competition are both being done by many athletes.

### Synchronous Coaching

In this model of coaching there is extensive hardware, technical support and manpower required to offer this method of coaching. The parties at both ends must also meet at a predetermined time to make this form of Coaching work. The Coach can see the athlete perform and make adjustments to technique and to the workout depending upon the performance of the athlete.

## Issues of Coaching Motor Skills at a Distance

Much of the literature disagrees with coaching athletics at a distance, “Complex motor skills cannot be acquired completely using electronic delivery systems, since the practice is not realistic enough, nor is the level of feedback sufficient”(Pallesen et al,

1999). I would have to agree with the literature, that to teach a novice how to complete a complex motor skill would be difficult. It is possible to teach the skill, but it would take a lot of time and effort on the instructor and student to make the learning situation workable. What I disagree with is that once the skill is learned to some degree of perfection, the athlete could then be fine-tuned by being coached at a distance using today's technology.

Currently in our province there are several athletes and coaches involved in a distance situation. Each of the athletes had been previously coached face to face and are quite high level athletes that have been on National Teams or compete at a national level. These athletes have the skills, but because of work and a reputation of a coach or the rapport the athlete has developed with the coach they still want to work with this person even though they do not live in the same city.

Motivation for the athletes is not an issue with a distance coaching situation as it may be in the classroom (Yellen, 1997-98). Athletes who choose to be coached at a distance have sought out this athlete coaching relationship although there may be coaches in the area. These athletes want to work with this person regardless of the problems of being coached at a distance.

Three Coaches, Les Gramantik, Lyle Sanderson and Mike Zimmerman have each coached Olympic athletes. Each is also currently involved in coaching an athlete at a distance. Les Gramantik (personal communication, February 16, 2001) believes that nothing can be better than onsite coaching, distance coaching is a compromise, the ability to adjust the program and the art of coaching is missing. Mike Zimmerman

(personal communication, February 18, 2001) finds that working on the small details is difficult and all the fine teaching must be done during face to face meetings and the athlete must agree with the coaches ideas on training and modify the workouts when needed on their own. All events have a significant technical component that must be monitored on a daily basis for high level success is what Sanderson believes (personal communication, February 22, 2001). Although he is not a believer in coaching at a distance, he had great success working with Diane Jones-Konihowski in the pentathlon. Lyle saw her two or three times a month while she lived in Edmonton, after she moved from Saskatoon where he previously coached her face to face. Her husband John was Lyle's eyes and contributed to the day to day feedback. Using Lyle's program, John's eyes for day to day coaching and a few face to face sessions per month, Diane was ranked number one in the world in 1978.

Bobbi Waldner (personal communication, February 18, 2001) who was coached at a distance for two years in High Jump, missed the daily social interaction. Being coached from a distance is very isolating. Also, with daily face to face contact, an advantage is that minor adjustments can be made in the scheduled workout, based on how the athlete is feeling, and on any injuries they may have experienced recently.

Shelly Ruecker, a sprinter, had her coach move away from Saskatoon she was an independent athlete and didn't necessarily want or need daily contact. What she did miss was the instant feedback during the workouts and some of the "learning" had to be delayed for the occasional face-to-face sessions. (S. Ruecker, personal communication, February 16, 2001)

Distance runner, Olivia Yuel, misses the feedback and the positive reinforcement offered to her in the face to face coaching situation. Olivia (personal communication, February 16, 2001) said her performances are adequate, but she is no longer improving as she was in the face to face situation.

Some high school aged athletes are currently being coached at a distance. Todd Johnston coaches Brandi Armstrong who lives in Melfort at a distance. Her parents sought him out to work with their daughter and through phone calls, email and one face to face work out per week, the situation has been successful. What Todd (personal communication, February 24, 2001) misses the most is the instant feedback that can be provided at a workout.

The main issue from the athletes and the coaches working with athletes at a distance is the ability to watch the athlete perform and give the appropriate feedback as stated by Pallesen (1999). Immediate feedback required by an athlete seems to be a constant among all athletes regardless of the technical difficulty in their event. Even the distance runners who rated their event the lowest in difficulty still wanted the feedback from a coach face to face.

Despite national caliber distance runners wanting immediate feedback, online coaching for distance runners is easy to find, there are several Internet sites including: Sidney Athletics and Interactive Coaching Training Programs, that welcome runners to be coached online for a fee. The workouts are prescribed online depending upon the ability of the runner, however, this is not much different than a correspondence coaching situation or getting workouts out of a magazine such as Runners World. There is no face

to face meeting with the coach. The coach never sees the runner run and prescribes workouts assuming that the technique of the runner is correct.

While distance runners can find online coaching, it is quite different for the more technical events. There is little if any advertising by coaches to coach online in the more technical events. Teaching fine motor skills is much more difficult and the effort required to coach an athlete online is much greater if the coaching is to be effective.

Despite the difficulties in coaching at a distance, there are athletes that still choose to be coached in this way. However, the relatively inexpensive technology of the Internet is not being used to make the coaching at a distance better.

Web video cameras have decreased in price and today there are portable video cameras for web use available for less than \$250.00. To make the asynchronous coaching situation better, video clips of the athlete performing their event or drills could be sent to the coach online and feedback could be received more quickly by the athlete after the coach views the video. The athlete and the coach could view the same video asynchronously and discuss the technique over the phone or online.

Synchronous distance coaching using the readily available and today's more cost efficient methods of videoconferencing could make the distance coaching situation better. The reason for distance coaching is so that the athlete does not need to relocate to the same city as the coach. Using the synchronous method of coaching would be ideal, and could be accomplished with the use of inexpensive video conferencing over the Internet. CUseeMe videoconferencing could be implemented to allow the immediate

feedback during a technical practice session. Using an inexpensive Web camera and a laptop computer, an Internet connection and an experienced computer user to operate the equipment could make the coaching situation synchronous from a distance. The feedback could be immediate during the performance or could be slightly delayed to allow the athlete to internalize the motor skill that they have just completed.

If this synchronous method of coaching becomes more popular for coaching distance athletes, most literature recommends that distance educators still make personal physical contacts with their students several times during a session. By meeting face to face this can close the emotional distance created the distance education and help create emotional bonds between the instructor and student. (Swartz & Biggs, 1999)

### Teaching Coaching Courses at a Distance

Instruction of a coaching certification course by means of distance education can be easily accomplished. Motor skills can be best learned when viewed by watching experts complete the task. (Ignico, 1994-95) Using videoconferencing, “insights and ideas can be shared across sites” (Lawrence, 1995-96) much like a face to face situation in which the coaches are sharing ideas. Group work can still be done by coaches to problem solve assignments given in class. By having the coaches enrolled in an online coaching course, this should also give them some expertise in enabling them to coach at a distance using the same technology.

## Conclusion

Coaches have used film or video analysis with biomechanics experts to try to improve an athlete's technique. This feedback is not synchronous and can assist a coach in trying to improve the performance of the athlete by altering a motor skill. Once the error in technique is found by the experts, the coach can have the athlete execute various drills to try and alter the motor skill. Coaches have used this technology for the last 40 years. Many coaches videotape technical sessions and competitions for analysis to try and correct errors prior to the next competition.

New technologies to improve performance have never been disregarded by coaches. Coaches are always looking for ways they can improve their athletes. Distance coaching using videoconferencing can improve the distance situation that has evolved between some coaches and athletes. Having online videoconferences at a practice sessions can be beneficial between the face to face meetings.

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