Technology In Taekwon-Do

Professional athletes are always looking for ways to improve to obtain the slightest of advantages over their opponents, in recent years these athletes have more frequently been turning to technological advancements to help identify areas where improvement can be made. These same advancements can be utilized in all levels of Taekwon-Do, from beginners to elite athletes.

Video Analysis

Most professional sports teams employ video analysts, their job consists of reviewing game footage as well as footage of training sessions to identify areas where individuals or the entire team can improve, they also review footage of upcoming opponents to identify their strengths and weaknesses.

Taekwon-Do Competitors can record their own matches and review them at a later date to help identify their weaknesses, they can then alter their training to try and improve in those areas. Many matches from tournaments around the world are being recorded and uploaded to video sharing sites such as Youtube As a result competitors can use these videos to study their opponents, identifying potential openings to attack as well as noting their favourite techniques so that they can better prepare for their upcoming matches.

I have often heard an instructor tell a student to practice in front of a mirror and look at their own techniques. This can work well for certain techniques however looking into a mirror to inspect a technique can often result in poor technique because the head is not in the position it should be, the individual is also limited to a single angle from which to inspect the technique. With a video camera it is possible to perform a technique correctly, record it from multiple angles and review it at a later date. It is also possible to refer to a previous recording of the same technique to observe changes and hopefully improvements. It is not necessary to have high quality recording equipment, most cell phones have video cameras built in, these would be sufficient for most situations.

While training for my 3rd Dan grading I periodically recorded myself performing patterns and various individual techniques. By watching these videos I was able to analyze my own techniques and progress over time. I made my initial recordings shortly after returning to full training from an extended injury break, making the recordings a good starting point, knowing that there would be plenty of room for improvement.

Upon reviewing these initial recordings I came to the realisation that no matter how well you think you perform a pattern or individual technique, this does

not always translate into how well they are actually performed, certain technical issues that I thought I had overcome were still noticeable and Sine wave and speed were both inconsistent. The initial recordings became the benchmark, I made note of key areas where I needed the most improvement and focused on improving those areas while training, I added additional stretches and strengthening exercises to my usual pre-class routine and made a point to focus on sine wave and pattern speeds.

I recorded my patterns a month later to see if the extra focus I had put on certain areas of my training had resulted in any improvements. The individual techniques that I was focusing on were starting to show signs of improvement, the level of flexibility that I had before the injury had returned and there was an improvement in power throughout the patterns. The most notable improvement was the consistency of the speed of my patterns, I was performing them at a slower speed than before and i was keeping a consistent speed throughout the patterns.

After watching my second recordings I noticed further techniques that needed improvement. I noticed that for certain hand techniques I was not starting the technique from the correct position, I reviewed my initial recordings looking to see if I always performed the techniques incorrectly and found that they were performed correctly in the initial recordings.

Incorrectly performing a technique on an inconsistent basis made it difficult to identify the reason behind the inconsistency. However by being aware that I occasionally performed the technique incorrectly I started to notice when the problem was occurring, after a while I was able to determine that when fatigue set in, I was more likely to make these mistakes. After identifying the reason behind the inconsistency I started realizing that fatigue was affecting various other techniques, I was also rushing through patterns when I was tired. By ensuring that I kept a steady pace throughout my patterns, especially when I was getting tired, I found that I then had the time between each technique to concentrate and perform the individual techniques correctly.

I have recorded my patterns multiple times since with an overall trend towards steady improvement however the negative effect of injuries and extended time away from training can be seen in the videos. One recording session was shortly after returning from an injury enforced break, I had lost flexibility and core strength and this showed through in my patterns. Since noticing this I have made a point of slowly easing back into training ensuring I am performing techniques correctly first and then working towards getting them to the same levels as before the injury.

The most interesting thing that I noticed from all of the recordings was that other students at training were most likely copying me. I had previously seen students incorrectly performing certain techniques and explained and demonstrated how to correct the technique, yet while performing my patterns I was making the same mistakes.

The Internet has become a great tool for instructors, 15 minutes watching videos on Youtube can provide new ideas and concepts that can be integrated into training sessions. Instructors are easily able to discover different exercises for warm ups as well as new stretches that can add variation to trainings which will help in keeping students enthusiastic about attending trainings.

When I first started training, self defence was very mechanical, most routines seemed to consist of a block followed by an elbow, knee, elbow combination. Access to Youtube combined with the new self defence syllabus introduced in 2008 is providing students with multiple options for each situation. If a student finds that they are unable to correctly execute a certain wrist lock or release due to physical capabilities or the size difference between their opponent, it is possible to look on Youtube and discover different methods that may be suitable in the given situation. If the student has access to a Smart Phone or Tablet PC they may even be able to find this solution during training and quickly test it out on their opponent.

Biometrics

In 2010 the Hamilton club was fortunate enough to have a training session using biometric software. The software used is called Siliconcoach (founded in 1997 by New Zealander Joe Morrison). Videos of techniques are recorded using digital video cameras and then imported into Siliconcoach. Once the videos have been imported, multiple videos of the same technique can be synchronised so that the techniques in all the videos reach their finishing point at the same time. It is then possible to load these videos side by side and view them at the same time at various speeds. Watching these videos played back in slow motion was helpful in identifying minor errors within a technique that could go unnoticed in a standard training environment. Possibly the best outcome of the session was seeing students notice mistakes within their own techniques that they were unaware of while also knowing what they needed to do to improve the technique.

Our session with Siliconcoach was brief and we only touched the surface of what the software can do. It is possible to determine the speed of a technique by selecting the start point and the end point and it will calculate to 1/1000th of a second how long it took to perform the technique. We tested this functionality with a front snap kick. The fastest technique recorded took around 0.4 seconds to perform from a stationary position. The average reaction time (interval time between the presentation of a stimulus and the initiation of the muscular response) of an adult is around 0.2 seconds, leaving a person an additional 0.2 seconds to actually perform a block or evade the attack. By reviewing recordings of a students techniques it is possible to identify ways in which the technique could be performed

faster or ways of disguising the initial moments of a technique with the aim of reducing the time that the opponent has to react.

Theory

When I was preparing for my 2nd dan grading I was studying computer science at university, the grading was at the end of the year and between studying for exams and extra trainings there was little time for studying Taekwon-Do terminology. I figured a way around this by creating a multi-choice quiz, which helped me study for my university papers as well as my grading at the same time.

Since the quiz was originally created it has gone through many different versions, Mr David Blackwell turned it into an online quiz and since then we have expanded it to include timed quizzes and high scores. There are currently over 400 unique questions covering the theory syllabus as set out in the colour belt and black belt handbooks. The questions currently cover all ranks between 10th Gup and 3rd Dan. There are also other quizzes that have been created to specifically test knowledge of pattern meanings and vital spots.

The theory test is becoming a popular way to revise the theory required for a grading with thousands of unique tests being taken since records started in 2011 with increased visits in the weeks leading up to a grading. It is possible to use the theory test on smart phones and tablet PCs, this could enable instructors to use the test to assess a students theory knowledge during normal training times, the results of which could be used to calculate the theory score for a students upcoming grading.

The Future

With the increasing popularity of tablet computers and smart phones such as the iPad and iPhone, there are increasingly more opportunities to incorporate technology into training sessions:

The Legacy Multimedia Encyclopedia contains videos of each individual pattern shot from 4 different directions (some of these videos have found their way onto Youtube) which can be played 1 movement at a time with the description of the movement also being displayed. This CD set is now out of date and most likely unplayable on modern computers. However if an updated version that worked well on a tablet PC was created that incorporated High Definition videos and detailed descriptions of each individual technique, it could become a must have item for every instructor. There is potential for further expansion to include examples of

step sparring, destruction and individual techniques.

Having every page of the 15 volume encyclopedia stored on a small tablet PC, could be very helpful for an instructor especially when a student asks a question to which they are unsure of the answer. Instead of having to remember the question and look up the answer after training and then tell the student at the next training session, an instructor could simply look it up on the Tablet and provide the student with an almost instant answer. Better yet the student could go and find the answer for themselves. Creating a digital copy of the encyclopedia would also present an opportunity to correct any known errors in the current editions. As well as updating to higher quality images which could provide more detail.

When the new Self Defence syllabus was introduced in 2008, a DVD of Mr Pellow demonstrating the new syllabus was produced. This DVD is useful for learning at home but at a training situation it is often not practical to set up a laptop and then load up the DVD to the exact technique that you are wanting to view. If this DVD was converted into an application for a tablet PC it could become a more viable teaching tool both inside and outside the dojang.