

THE BENEFITS OF TECHNOLOGY AIDED COACHING IN SKILL IMPROVEMENT OF SPORTSMEN

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ABSTRACT

Technology Aided coaching's are man-made means developed to reach human interests or goals in or relating to a particular sport. Technology in sports is a technical means by which sportsmen attempt to improve their training and competitive surroundings in order to enhance their overall athletic performance. It is the knowledge and application of using specialized equipment and the latest modern technologies to perform tasks more efficiently. Examples of sporting technologies include golf clubs, tennis rackets, pole vault poles, athletic sports gear (clothing and footwear), advanced computer stimulations and motion capture. Recent developments in sporting technologies have created a variety of products aimed at improving and increasing athletic performance. Athletic health can be maintained and observed, and injuries treated, through the production of modern sporting technologies such as heart rate monitors, pedometers and body-fat monitors. Through this, a greater deepened knowledge of the human body and its potential has been recognized, allowing athletes to train and compete in sports to a much older age. Participant safety at all times has also been made possible through the development of certain sporting equipment, such as helmets and body protection which are used in boxing and ice hockey to help prevent injuries. Modern sporting technologies have also made competition judging easier and more accurate, and spectator interest and excitement is enhanced by broadcasting and in-stadium displays (scoreboards).

BENEFITS

1. CREATING FLEXIBILITY

Sports gear such as clothing and footwear should be user-friendly and include valuable properties such as strength, flexibility, density, thickness, durability, toughness, resistance to moisture and more importantly cost. Footwear is generally considered more for comfort and injury avoidance rather than performance enhancement, whereas clothing such as the full body suits used in swimming are often claimed to rationalise the competitor's performance times where winning or losing the race is measured in hundredths of a second. Sporting equipment such as the composite tennis racket has been created in order to provide enhanced ball speed, and reduce the potential vibration that can lead to a condition known as tennis elbow (damage to the small blood capillaries in the muscles and ligaments that surround the elbow joint). In other sporting equipment such as the golf club, the overall mass of the club has decreased which is believed to result in a greater achievable distance and possibly a more precise shot. The bicycle has also undergone modern day advances with the development of specialist wheels, pneumatic tyres, break levers and pedals, which are all aimed at increasing stability and rigidity of the bicycle. Prosthetic devices have also been constructed for those athletes with a specific disability. Examples include the springlite prosthesis device created for those athletes deficient of a lower limb, which acts with a 'springboard-like' effect where with each step as the runner strikes the track, the device returns energy and permits running gait. The reduced mass of the springlite device compared to that of the earlier wooden prosthesis is firm yet supple for sprinters, and provides some shock absorbing properties for marathon runners. Wheelchair devices used in sporting activities have also become more sophisticated, for example, with sharply slanted back wheels in tennis to allow the player to move swiftly across the court from side to side.

2. PERFORMANCE IMPROVEMENT

Technologies such as CAD (Computer Aided Design) can play a major role in the improvement of sporting equipment. CAD allows virtual design and testing techniques to be applied to all aspects of sport and leisure equipment research and development. CAD offers an efficient means of considering and assessing new products and ideas, and is primarily used to improve safety, comfort and effectiveness of specialised sports equipment. CAD is also used regularly in the justification of physical facts and figures, and for both competitive and training circumstances. Other technologies such as 'smart' equipment can be used to evaluate human performance. These include sensors and computers as part of their utility and can be used by athletes as part of their training regime. Examples of 'smart' equipment technologies include devices used for exercise stress testing and cardiovascular assessment, human reaction time and frequency of movement meters, and jump and run characteristics devices. More modern technologies such as motion capture analysis are also used to analyse athletic performance. This involves digitally recording the movements of athletes during sporting activities which can then be used for personal performance evaluation by the sports person, for enhanced spectator entertainment, and in some cases medical treatment.

3. TIME MANAGEMENT

Using new technology time can be increased and in cricketers use net ball technology and make the practise sessions. Therefore the cricketers can save their time easily and attend tournaments without any fear.

4. AIMS

The main aim of the research paper is to provide basic information about how technology aided coaching is improving the skill set of the players.

5. ANALYSIS

The Sport and Exercise Sciences Research Institute within the University of Ulster aim to facilitate, co-ordinate and carry out high quality research, and promote a vibrant culture of research and scholarship with the university, health providers, government bodies and other centres of excellence. The group encompasses several areas of research to include adolescent lifestyle and health, health benefits of physical activity, social sciences of sport, sport and exercise psychology, physiology and biomechanics, and sport technology. In a football tournament, two football strikers have each scored four goals over four games, it would be easy to assume that both are performing well. However, if striker A has had 16 shots on goal to striker B's eight shots, the former's success ratio is 4:1 compared with a much more impressive ratio of 2:1 for the latter. Comparing performances between teams, team members and within individuals is often easier and more accurate if the performance indicators are expressed in terms of ratios, such as possession to turnovers, winners to errors, and passes taken to passes completed. An individual's performance profile can become distorted if the correct comparisons are not made, since profiles may differ according to the opposition. For example, presenting an individual soccer midfielder's performance could be misleading without comparison with the opposing player's or team's data.

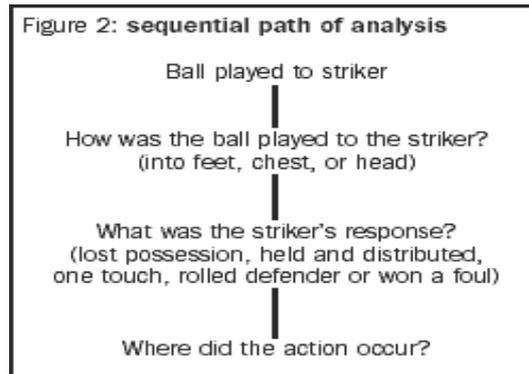
Performance data for an individual can be presented in three ways to evaluate success (6)

1. In relation to the opponent's data. This allows for a direct comparison with the opposition, but could be misleading if the players are not of a similar standard;
2. In relation to players of the same standard. This allows for comparison between equals, which is useful providing data of this nature is available or can be compiled;
3. In relation to their own profiles of previous performances. Over the course of a number of competitive matches, a normative profile of a player or team can be created for comparative purposes. A player can then be assessed against his own normative profile to assess the relative merits of his latest performance.

Performance can be analyzed in two ways within team sports

7. Individual assessment of players within the team, for example strikers in football;
8. Assessment of an aspect of performance for the whole team, eg monitoring of scoring effectiveness in basketball.

There are two main methods of coding the observations made within a sporting situation: 'live coding' and post-play coding. The former requires a high degree of competency in coding a sporting situation, with video footage fed directly into a laptop and coded via the keyboard as events unfold within the training session or game. With post-play coding, the video footage is again fed into a laptop and the information coded via the keyboard, with the advantage that the footage can be slowed down or reviewed more than once to ensure the observations are accurate. To show how this process can work in practice, I would like to present an example of one of my own performance analyses – an assessment of strikers for an English Nationwide League Division Three Football Club. My first priority was to find out what the club wanted to gain from the analysis. The outcome was confirmation that it wished to improve the feedback to coaches and players on individual and team performances. It was agreed that the first stage of the analysis would focus on the role and function of the strikers within the team, and that two full games would be filmed in similar fashion to a 'player cam'. The players themselves were kept in the dark about what was happening to ensure they played normally rather than acting up for the cameras. The first step in designing the analysis system was to gain a logical understanding of the strikers' involvement within the team's tactics. The plan that emerged was that on gaining possession of the ball, it was to be played into the strikers and then laid off to the midfield players, who would try to spread the play to the wings, resulting in a cross or through ball for the strikers to achieve a shot on goal. The coaching staff realized that this form of tactical play relied heavily on what the strikers did with the ball when played into them, and was essentially the key to the attacking strategies. We decided that this would be the focal point of the analysis.



The pre-analysis consultation also highlighted the club's interest in identifying a performance profile for its strikers. This was built on the path outlined in figure 2 (above) and based on movement sequences which would expose the strengths and weaknesses of individual players (see figure 3, above). I made my observations with a computerized notational match analysis software package called Nordulus Observer Pro, and the two matches were coded manually post-competition. The results obtained from the analysis were then relayed to the club's coach, who then fed them back personally to the players, along with recommendations for improvement. The following is an example of part of an individual striker's performance profile built up in the manner described above. The main emphasis was on how this player used possession of the ball, when played into feet, head or chest. The ball was played into feet. 27 times during the game, of which the player:

- held the ball and distributed 10 times, six in midfield and four in the attacking third;
- played the ball off one touch six times, three in midfield and three in the attacking third;
- rolled the defender twice, in midfield and the attacking third;
- lost possession nine times, four times in midfield, four times in the attacking third and once in the defensive third.

The analysis also identified the number of headers won/lost, shots on and off target and number of times possession was won and lost, as follows:

- 10 headers won, of which four in midfield, four in attack and two in defense;
- nine headers lost, of which four in midfield and five in attack;
- five attempts on target, two with the head and three with the foot, with one successful strike;
- two attempts off target, from a header and a strike;
- possession won seven times, five times through closing down and twice by winning tackles;
- Possession lost twice in midfield through being closed down.

The performance profiles identified the personal strengths and weaknesses of the individual players, providing a technical focus for future training sessions. For example, it showed the coach needed to:

- work on the players' ability to maintain possession of the ball when played into the chest;
- improve the link-up play with the strikers and midfield players to help decrease the number of possessions lost and maintain fluency within the attack;
- Work to the strikers' strengths of making successful use of possession when the ball is played into their feet.

The players were also given individual goal-setting plans aimed at overcoming their weaknesses. To establish the value of the whole process, another full game was analyzed in the same way four weeks later. The results showed significant improvement by the strikers and substantial progress towards their individual goals. The club agreed that the project had been successful and that it had highlighted weaknesses they hadn't been aware of. The players responded well to the feedback and targets. And the whole process gave rise to a second project involving the central midfielders.

6. THE SECOND SCENARIO

I would like to present is a performance analysis I carried out for a National Junior League Under-18 basketball team. As coach of the junior men's basketball team, I and the rest of the coaching team wanted to identify areas of weakness within the whole team's performance, providing objective measures to explain some recent poor performances. The team has four different plays (structured offence/attack) that are practiced for use within game situations, but despite reinforcement from the coaching team, they did not seem to be using these plays consistently in match situations. When they did run a structured offence, as practiced, they seemed to enjoy more success than when they fell back on a more freely structured approach. A performance analysis process was used to provide an objective analysis of the team's offence, producing a ratio of the number of plays run to the number of unstructured offences, and the success ratio for each type of offence. As

with the previous example, four games were filmed for analysis and observations were made with the same system. The results of the analysis are shown in figure 4, below.

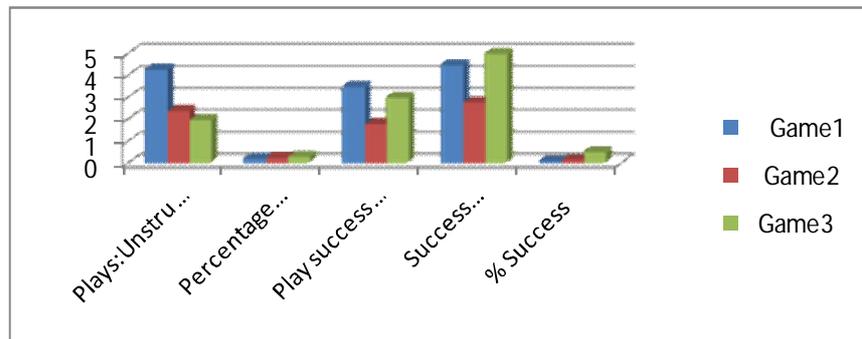


Figure 1: Basket ball team analysis

The analysis confirmed the coaching team's belief that the plays were not being run as requested, and also showed that the success rate of the plays were much higher than those of unstructured offences. Using this material, the coaches were able to present their players with an objective demonstration of the value of using the plays practiced in training. Filming four games in succession – two after the analysis – enabled the coaches to track progress and provide positive feedback to the players. The results of the analysis can be retained for future reference and as the basis for further analyses. All in all, the teams have very positive results.

7. RESULTS

The use of modern technologies in sport may mean that competition at the uppermost level is only affordable to the leading top athletes due to the potential high costs of specialised sports equipment. In those sports incorporating individuals with a particular disability, there are a variety of methods in which assistance can be given. For example, modifications to buildings can be made to make them wheelchair accessible, specialised equipment can also be produced and training to sports members can be offered in order to give specific assistance to those with a disability.

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