

## CHAPTER 12: Modern technology in sport

### Practice questions at - text book pages 192 to 193

- 1) Modern technology has been said to increase participation in sport. Which one of the following has had the greatest impact?
- the design of sports clothing.
  - the use of composite materials that make sports equipment lighter and stronger.
  - the development of climate chambers that can mimic different environment conditions.
  - the provision of sporting facilities.

**Answer:** d.

- 2) Which one of the following definitions does not describe the benefits of modern technologies on fair outcomes?
- electronic timing devices provide instant results.
  - official's mistakes are exposed.
  - modern technologies expose foul play.
  - modern technologies improve sport provision.

**Answer:** d.

- 3) The efforts to control the use of performance enhancing drugs in sports will only be effective if they:
- appeal to personal values of athletes themselves.
  - provide education programmes emphasising the dangers of drug abuse.
  - appeal for fair play within sports.
  - recognise that most use of drugs is a form of deviant overconformity.

**Answer:** d.

- 4) The Athlete Biological Passport is part of modern technology. What is its main function in elite sport?
- it profiles biological markers of doping and results of doping tests.
  - it is an excellent alternative to ensure fair outcomes.
  - it is administered to establish whether an athlete is manipulating his/her physiological variables.
  - it serves as a platform for an ethical Rule of Sport.

**Answer:** a.

- 5) Sports entertainment in the twenty first century has seen the emergence of the sports pundit. Identify from one of the following, the key role of a sports pundit:
- to provide spectator interest and excitement.
  - to communicate results to an audience.
  - to offer his or her opinion or commentary on a particular subject area.
  - to provide constant interruptions during a sporting contest.

**Answer:** c.

- 6) How can sports analytics assist in the development skill and technique?

4 marks

**Answer:**

- Sports analytics' major role is providing **accurate** and precise **feedback** using both **quantitative** and **qualitative** data analysis.
- **Visual feedback** can be used to make immediate technical adjustments that can help fine tune technique.
- Computer simulation can predict techniques that can be used when **planning future** changes in technique.
- Over time, the coach and performer can assess if technical improvements have been made.

7) How can adaptive and assistive technology increase access to sport for the disabled?

4 marks

**Answer:**

4 marks for four of:

- **Assistive technology** refers to any item, piece of equipment that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.
- For example, hiking poles offer increased support and stability on unfamiliar ground and uneven surfaces, help improve posture and increase confidence for the individual..
- Assistive devices can help to improve the quality of life for the disabled and maintain their sense of independence.
- **Adaptive technology** covers items that are specifically designed for persons with disabilities and would seldom be used by non-disabled persons.
- For example, wheelchairs used for wheelchair rugby and wheelchair basketball, are designed to withstand heavy impacts and be easily manoeuvrable.
- Throwing frames assist in weight bearing, thus enabling a seated disabled athlete to throw.
- Adaptive devices enable disabled sports performers to participate in sports that previously have been inaccessible.

8) Identify and describe a modern technology that aids analysis and feedback for improvements in sporting performance.

4 marks

**Answer:**

Note that there are many possible answers available.

4 marks for four of:

- **GPS positional software:** for example, Prozone uses cameras and sensors around the playing area to collect quantitative data.
- Analysing the position and speed of players such as average player recovery time, average total distance run by players, marking on and off the ball play of individual players.
- Giving fitness, strategy and tactics KPIs.
- Another example is the use of Smart replay technology such as **HawkEye** used in tennis, cricket and snooker.
- HawkEye is an electronic line calling service that delivers instant video replays.
- To assist officials with close decisions on foot faults or line calls, for example in a game of tennis.
- Offering players the opportunity to contest close umpiring decisions.
- Providing entertainment for live and armchair viewers.
- Post-match data for **quantitative** and **qualitative** analysis.
- HawkEye is also used to verify lbw decisions in cricket.
- And positional accuracy in snooker.

9) Identify the disadvantages of using technology in assisting officials in their decision making.

3 marks

**Answer:**

3 marks for three of:

- Officials may become too **reliant** on technology systems and so could lose skills such as time-keeping, the ability to make quick, decisive marginal decisions.
- Technology **can't be used for everything**/officials are an integral part of the sporting contest.
- **More officials** are required, for example, the 4th referee in rugby.
- It can **slow down** the speed of the game whilst replays are viewed.
- **Breaks in play** can be disruptive for spectators if too long.
- It is **not always reliable**. Systems break down.
- **Cost** limits use of technology.

10) Discuss how increased technology has helped officials in their decision making and its impact on the sporting event.

3 marks

**Answer:**

*3 marks for three of:*

- Ensures *correct decisions* are made/fair competition/less controversy/players more confident in decisions.
- Helps *officials communicate* with each other.
- *Less pressure* on officials to make the final judgement/less post-match criticism.
- *Timing/measurement accurate.*
- Creates *excitement* in crowd waiting for decision/allows players to officially challenge decisions.

11) Discuss the notion that sports performers are only as good as the technology that supports them. Use examples from global sports to support your answer.

20 marks

**Answer:**

2 marks for two of:

- Sports performers want to **improve**.
- And so are willing to take on **different methods** to do so.
- Otherwise they are left behind in the race to be the best.

2 marks for two of:

- Some **Governing Bodies** have striven to keep technology's influence to a minimum.
- For example, the only change in **basketball** in the last 35 years, has been the replacement of the official leather ball with a composite material that gives greater consistency and grip.
- **Table tennis** has maintained the traditional celluloid ball and wooden bats.
- **Cricket** has retained its traditional ball.

4 marks for four of:

- **Other sports** have benefited from **major changes in equipment technology**.
- For example, **skis** have changed shape to give greater efficiency.
- **Pole-vault poles** have changed from wood to bendy bamboo to aluminium (and landing in sand pits) to highly flexible fibreglass poles.
- That catapult an athlete over a bar 5 and 6 metres for females and males respectively.
- And deep foam cushioning for landing.
- **Athletic tracks** were surfaced with crushed cinders as recently as the 1964 Tokyo Olympic Games.
- The 1968 Olympic Games was the first time a polyurethane surface (known as Tartan) was used.
- Records tumbled at these Games.

12 marks for twelve of:

- What are available to all sports performers are technologies that **refine technique and fitness**.
- And hence make a difference to their performances.
- **Instant replay** can give **feedback** information to both athlete and coach during training and performance that could assist the technical performances that may follow.
- **Software systems** such as Dartfish for individual sports.
- Provides frame to **frame comparison** between the performer and a technical model.
- And Prozone analyses the **positions** of players on the pitch by using up to 12 fixed cameras and sensors.
- Enabling a coach or manager to assess fitness levels.
- And **analyses the strategy and tactics** within the game.
- **Scanning** technology can be used to create personalised footwear.
- **Force plate technology** tells the coach the precise way in which the foot is active during the strike with the ground.
- And enables him or her to assess whether changes in foot posture are required.
- This technology has been used to support elite triple, high and long jumpers within the UK over the 15 years.
- And has assisted athletes such as Jonathon Edwards – current World record holder for triple jump.
- Data from **wind tunnel technology** has been used in refining the design of equipment such as cycles and helmets.
- This technology has supported the enormous success of the Great Britain cycling squad in the 2008 Olympic Games in Beijing.
- **GPSports** technology monitors a position, speed and cadence, useful to countryside sports such as mountain bike riding and walking.
- A **heart rate monitor** accurately records and displays heart rate function during physical activity.
- Allowing athlete to predetermine and maintain the training intensity or training zone during the session.
- And can link to heart rate monitors and even video to gain a better picture of an athlete's performance.
- All these technologies have created modern global sport that strives to achieve higher, further and faster performances.

12) What is meant by the Athlete Biological Passport and how does it function in the detection of drug abuse in sport?

2 marks

**Answer:**

- The *Athlete Biological Passport* is based on the personalised monitoring of *biomarkers* of doping that can be used to detect doping.
- And serves as a platform for an *ethical Rule of Sport*.

13) Sports are a form of entertainment. How have contemporary technologies enhanced the entertainment value for both live and armchair spectators?

5 marks

**Answer:**

*5 marks for five of:*

- *Miniaturized video cameras*, in places such as racing cars, provide TV footage in ways that previously was not possible.
- The analysis of sport performance provided by officiating technologies such as *HawkEye's* electronic line-judging system and *goal-line technology*, have greatly enhanced the spectator's knowledge and involvement.
- And help to diffuse audience aggression and frustration, when pressure points do not fall prey to with bad umpiring decisions.
- A *'mic'd up' referee* further facilitates the involvement of live and armchair fans to engage in real-time play.
- Spectator interest and excitement are enhanced by broadcasting and *in-stadium replay screens* and scoreboards that can very quickly communicate results to an audience.
- A *wider range of sports* are more accessible and visible through the development of technology, for example, glass walled squash courts.

14) Discuss the negative and positive impact of technology on the performer.

10 marks

**Answer:**

*Note: The response answer is immense and so for 5 marks for each part of the question, it is advisable to discuss at least three major impacts.*

**Positive impacts:**

- **Nanotechnology** has created a variety of products aimed at improving and increasing athletic performance.
- For example, nanomaterials, such as high modulus carbon are being incorporated into various sports equipment.
- To improve **strength** and stiffness, durability and reduced weight in equipment such as tennis rackets and helmets.
- And thus help to **prevent injuries**.
- New technologies have assisted in the **detection of illegal drug abuse**.
- The development of the **Athlete Biological Passport** provides a personalised monitoring of biomarkers of doping in which any genetic tampering would be detected.
- Technological improvements in **equipment**, smart **clothing** and **footwear** have both aerodynamic and physiological benefits for sports performers.
- **Prosthetics** are made for those athletes with specific disabilities.
- **Wheelchairs** developed to meet the specific demands of the sport.
- For example, wheelchairs used for wheelchair rugby and wheelchair basketball are designed to withstand heavy impacts and be easily manoeuvrable.
- For example, sports socks are more flexible, breathable and wick away sweat.
- **Compression clothing**, such as body suits, increases venous return and  $\dot{V}O_{2max}$  to aid recovery and reduce the effects of delayed onset of muscle soreness.
- **Footwear** can be made to match the shape and **mechanics of feet** and made from materials that create a light, durable and activity-specific design that can reduce the risk of injury.
- **Sport analytics** (the provision and understanding of feedback data) has been used to help with psychological and sociological profiling and thus develop Key Performance Indicators that can be used in biometric health screening, talent identification and a variety of other applications.
- GPS and associated apps from **GPS technology**, can be used to create training programmes, monitor progression and recovery during and between training sessions, and injury prevention and rehabilitation.
- Nutrition analysis and menu planning software are used to create meal plans to achieve performance goals.
- Climate chambers are used to recreate competition environments and so can help elite performers to prepare for major competitions in hostile climates such as extreme heat and humidity.
- Modern technology has improved facilities for all performers.
- For example, multi-use games areas, such as 3G/4G turf technology offer quality all weather, all the year round playing surfaces, thereby offering the potential for greater participation.

**Negative impacts**

- **Protective equipment**, such as helmets, can create a more **aggressive** playing environment.
- The growing use of drugs in sport has led to many high profile athletes **cheating** the system.
- **Performance enhancing drugs** are part of the win-at-all-costs ethic.
- And can lead to **aggressive** behaviour in addition to detrimental **side effects**.
- There is a question of **affordability** for modern sports equipment, such as prosthetics and clothing, unless the performer is sponsored.
- On the global stage, performers from third world countries, may be at a disadvantage as they may not have **access** to good training **facilities** and sports equipment.
- There is a continued debate on how far to go before technology enhances performance **unnaturally**.
- Elite athletes could see a **pay decrease** during salary negotiations not based on performance, but on sports analytics data.
- Data analysis can be **time consuming** and at times **overwhelming**.

15) Modern technologies can enhance and limit sports entertainment. Discuss.

10 marks

**Answer:**

5 marks for five of enhancing sports entertainment:

- **Miniaturized video cameras**, in places such as racing cars, provide TV footage in ways that previously was not possible.
- The analysis of sport performance provided by officiating technologies such as **HawkEye's** electronic line-judging system and **goal-line technology**, have greatly enhanced the spectator's knowledge and involvement.
- And help to diffuse audience aggression and frustration, when pressure points do not fall prey to with bad umpiring decisions.
- A **'mic'd up' referee** further facilitates the involvement of live and armchair fans to engage in real-time play.
- Spectator interest and excitement are enhanced by broadcasting and **in-stadium replay screens** and scoreboards that can very quickly communicate results to an audience.
- A **wider range of sports** are more accessible and visible through the development of technology, for example, glass walled squash courts.

5 marks for five of limiting sports entertainment:

- High tech equipment and live action is **expensive** to buy for the average spectator.
- For example, high definition TV sets and accessing **pay-per-view** events.
- Immediate statistics and replays can be **distracting**.
- Commercial adverts **disrupt playing schedules** for the armchair spectator.
- And create a **fashion led demand** as opposed to what is sensible to wear.
- **Punditry** analysis may be irritating for the spectator when it is interrupting the event.
- The pre-match show may **not be of interest** to some armchair spectators.

16) Discuss the use of modern technologies in talent identification programmes.

4 marks

**Answer:**

4 marks for four of :

- Each national governing body identifies its own requirements with the help of Talent ID scientists, whose background in **sports science**, physiology and skill acquisition enables them to research and define a **profile of successful athletes** in that sport, such as what qualities do elite rowers need, what qualities do windsurfers or volleyball players have in common?
- This has created an industry called **sport analytics** (the provision and understanding of feedback data) that has been used to develop psychological and sociological profiling and **Key Performance Indicators** that can be used talent identification.
- **Quantitative** and **qualitative** data needed to create a profile can be used to assess the suitability of the talented performer to the demands of the sporting activity.
- Pathway analytics enables sports to robustly **measure** and benchmark the effectiveness of their performance pathway using specialist diagnostic tools.
- **GPS tracking equipment** and screening technology can assist in the monitoring and development of positional play and fitness.
- These modern technologies are **expensive** to operate since they need specialist staff and facilities.
- And very **few** of these talented youngsters will make it through the academies to the elite performance level.
- It could be argued that the **strong scouting network** works just as effectively when looking for talented youngsters.

17) a) What is sports punditry?

2 marks

**Answer:**

- Sports punditry describes a service that uses **popular media sports personalities**, such as Gary Lineker and Sue Barker, who offer their **knowledgeable** opinions whilst action is ongoing, during breaks of play whilst replays are being judged.

b) How does sports punditry enhance spectator entertainment?

3 marks

**Answer:**

- Sports pundits provide a **personal touch** to the sporting event. This could be relevant stories from past experiences.
- Sports punditry provides an **educational** role as the sports pundits are able to give the spectator a greater understanding of what is going on, the techniques involved and the rules that should be followed.
- Thus giving spectator greater **insight** into the event.
- Because of the popularity of the pundit, sports punditry may attract a **bigger armchair audience** to the sporting event.
- All of which can increase sports entertainment.