

# 11: Analysis of Sports Performance

## 11.1 Introduction

Every sportsperson is aiming to improve their performance in terms of their technical ability, physiological fitness, psychological strength and biomechanical efficiency. We tend to become even more reflective and ask more questions when things are not going well and we are losing competitions. In order to analyse our performances we need a structure or framework in which to work. This unit provides a structure for athletes to interpret their performances and their successes and failures.

By the end of this unit you should:

- know the performance profile of a sporting activity
- be able to analyse sporting performance
- be able to provide feedback to athletes regarding performance
- understand the purpose and resources required for analysing different levels of sporting performance.

Assessment and grading criteria		
To achieve a PASS grade the evidence must show that the learner is able to:	To achieve a MERIT grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a DISTINCTION grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
<b>P1</b> describe the performance profile of a selected sporting activity	<b>M1</b> explain the performance profile of a selected sporting activity	<b>D1</b> analyse the performance profile of a selected sporting activity
<b>P2</b> describe five factors that may influence the performance of an athlete		
<b>P3</b> perform an assessment of a selected athlete undertaking sporting activity using three components of their performance profile, with tutor support	<b>M2</b> explain the function of the cardiovascular system	<b>D2</b> analyse the performance of a selected athlete using three components of their performance profile.
<b>P4</b> provide feedback to the athlete based on the assessment of their performance, with tutor support	<b>M3</b> independently perform an assessment of a selected athlete undertaking sporting activity using three components of their performance profile.	
<b>P5</b> explain the purpose of, and the resources required for, analysis at two different levels of sports performance.		

## 11.2 The Performance Profile of a Sporting Activity

P1

P2

P3

M1

M2

The performance profile is a visual method of looking at performance in a broad manner. It is used by the athlete and coach to pinpoint strengths and weaknesses and this information is then used to design future actions. When a coach works with an athlete the coach can make decisions on techniques and changes, with the methods being imposed on the athlete by the coach. In this method the success or failure of the training programme is viewed by the athlete as being dependent upon the effectiveness of the coach in meeting their needs.

However, the coach only has the 'outsider' view. Butler and Hardy (1992) identified that this was a major weakness as it affected an individual's intrinsic motivation. Bull (1991) agreed that an athlete's commitment to their training schedule and the accompanying educational work would be affected if the coach who had imposed the schedules was not always present. It would seem to be a more productive relationship if the expertise of two people was utilised. The coach is the expert in terms of 'the outsider' view of the athlete's performance, while the athlete is the expert in terms of 'the insider' view of their experiences and how they are feeling.

Butler (2000) described the athlete's role as follows:

'The athlete's assertions, discriminations and insights are not only valid but valuable. They make a significant contribution to the development of an effective training programme.'

The performance profile gives the coach and athlete a tool to provide a visual display of the areas of performance that are perceived to be important in working towards a top performance, and their assessment of the current position in relation to this.

### Using a Performance Profile

First, you need to choose the sporting activity you want to examine and then you can look at any of the following:

- technical and tactical (shooting, passing, tackling)
- physiological fitness (strength, power, flexibility)
- psychological (motivation, arousal, confidence)
- biomechanical (speed, motion, momentum).

To construct a performance profile you would do the following:

- The athlete is asked to think about the qualities or skills that are shown by those athletes who perform at the top level of their sport in the same position, role or event as themselves.
- These qualities or skills are called the 'constructs', and they are placed on the performance profile.
- The athlete then describes their current position in terms of their competency by giving themselves a mark out of 10. This score of 10 is in comparison to an athlete they consider to be excellent in their chosen sport.
- The coach may do the same exercise to provide the 'outsider viewpoint'.

These scores can be filled in on the performance profile and used to:

- identify their current level of competence
- identify areas of strength and weakness
- monitor progress and any changes occurring
- monitor effectiveness of training programmes
- identify any differences in the viewpoints of athlete and coach
- provide a basis for designing a training programme.

### Technical Analysis of a Sporting Activity

You can analyse a sporting activity in terms of the whole activity, an individual position or an individual aspect of the game.

#### Whole Activity

Snooker, for example, can be broken down into the following constructs:

- stance
- snookering
- cueing action
- back spin
- bridging
- top spin
- striking
- side spin
- long potting
- deep screw
- short potting
- follow through
- cushion shots.

### Positional Activity

A midfielder in football would perform the following techniques:

- short passing
- blocking
- long passing
- long-range shooting
- crossing
- close-range shooting
- dead ball work
- defensive heading
- throwing in
- attacking heading
- tackling.

### Individual Aspect of an Activity

A tennis player would perform the following backhand shots:

- smash
- lob
- volley
- flat drive
- half volley
- topspin drive
- drop volley
- slice.

	1	2	3	4	5	6	7	8	9	10
Short passing										
Long passing										
Crossing										
Dead ball work										
Throwing in										
Tackling										
Blocking										
Long-range shooting										
Close-range shooting										
Defensive heading										
Attacking heading										

Fig 11.1 Performance profile for a midfielder

## Physiological Analysis of a Sporting Activity

This is completed in the same manner as the technical analysis except the constructs will be different (see Figure 11.2).

## Psychological Constructs

This is also completed in the same manner as the technical analysis, except the constructs will be different (see Figure 11.3).

	1	2	3	4	5	6	7	8	9	10
CV fitness										
Anaerobic fitness										
Speed										
Strength										
Power										
Muscular endurance										
Flexibility										
Lung function										
Body composition										
Agility										
Reaction times										
Core stability										

Fig 11.2 Physiological constructs for a tennis player

	1	2	3	4	5	6	7	8	9	10
Intrinsic motivation										
Extrinsic motivation										
Arousal control										
Anxiety levels										
Attentional focus										
Confidence										
Controlling aggression										
State management										
Concentration skills										
Relaxation skills										
Emotional well-being										
Mental rehearsal										
Imagery skills										

Fig 11.3 Psychological constructs for a boxer

## Biomechanical Constructs

A fourth analysis can be completed of the biomechanical demands of a sporting activity (see Figure 11.4).

	1	2	3	4	5	6	7	8	9	10
Development of velocity										
Velocity at release										
Acceleration										
Application of force										
Use of levers										

Fig 11.4 Biomechanical constructs for a javelin thrower

## Benefits of Performance Profiling

As a technique for analysing performance, profiling works very well because it can take into account a vast amount of information for analysis by coach and athlete. It also considers the roles of coach and athlete as equally important with their different viewpoints on performance. Crucially, it takes into account the opinion of the athlete and gives them an active role in the analysis process, allowing them to take ownership of their performance and outcomes. It also allows the coach and athlete to identify any areas of mismatch where there is a differing opinion, and provides a basis for discussion. It can act as a process of education for the athlete as they become self-aware of the varying demands on them as well as their relative importance.

Performance profiles can form the basis of a review of progress on a monthly basis as the athlete and coach track their progress. They can also inform the process of goal setting to set the way forward.

### Key learning points

- Performance profiling is a way of looking at performance in a broad sense.
  - It involves the opinion of the athlete as well as that of the coach.
  - It can be used to identify strengths and weaknesses.
- Performance profiling can be applied to technical, physiological, psychological and biomechanical components of performance.

The effectiveness of an individual's sporting performance comes down to a range of factors, which can be split into two categories:

- intrinsic – factors within the body
- extrinsic – factors outside the body.

Intrinsic factors would include:

- age
- health
- diet
- previous training
- motivation
- confidence
- ability level.

Extrinsic factors would include:

- group dynamics
- group cohesion
- temperature
- time of the day.

## Intrinsic Factors

### Age

It is generally accepted that performance declines after the age of 35. Up to the age of 35 the body is building up in terms of bone and muscle strength and cardiovascular fitness. After the age of 35 these structures of the body slowly start to lose their efficiency with a resulting performance decrement, although, having said that, training will slow down this decline and maintain strength, flexibility and cardiovascular fitness. We have seen many sportspeople remain at the top level despite being over the age of 35. Martina Navratilova was winning tennis titles into her fifties. Ryan Giggs, Simon Shaw (Rugby Union), Ricky Ponting (cricket), Lee Westwood (golf) are all still able to perform at the top level in their sports despite their age.

### Health

The health of an individual's organs and systems are all vital in gaining their adaptations from training and then producing top-level performances. The body functions as a whole organism made up of many systems and organs, and poor function in one area will affect the functioning of the whole organism.

### Diet

There is a clear link between nutrition and health. When we eat we are ultimately feeding the cells of the body with nutrients to allow them to function and give them the basic building blocks to remain healthy. If we feed our cells with fresh, nutritious foods we will have healthy cells, contributing to our health. But if we feed our cells with poor-quality nutrients from processed or fast foods we will end up with unhealthy and ultimately diseased cells, contributing to illness.

### Previous Training

Our current position is the result of all the activity we have or have not done in our lives. The performance the athlete is able to produce depends upon the quality of their training programme and the fine balance between training and rest periods.

### Motivation

Motivation is the amount of drive and energy that we possess at any point in time. It influences our desire to win. If we have trained hard and looked after our nutrition and rest patterns, we will feel better and subsequently more motivated.

### Confidence

Our confidence is the extent to which we feel we will be successful; it is affected by a range of factors.

These will include our previous experiences and our perception of these experiences as either successful or otherwise. In addition, there is our perception of our opponents and our ability to deal with the environment in which we are placed. For example, we may feel more confident when we compete on our home territory and slightly intimidated when we go away. Our confidence level is closely related to our anxiety levels and if we are anxious about our performance this will start to erode our confidence levels.

### *Ability Level*

Our ability is the natural level of skills we possess and is the basis for developing further skills. Our performance is clearly the result of the ability and skills we possess.

## **Extrinsic Factors**

### *Group Dynamics*

Group dynamics refers to the sum of the processes occurring within the group that will influence its effectiveness. The most successful groups have a high level of attractiveness for the individual members, and the members will also share the same goals and work towards achieving these objectives.

### *Group Cohesion*

Group cohesion is the extent to which the individual members of the group have an attraction to the

group and keep the group together. Cohesion can be task-related or socially related. Task cohesion is the extent to which you are willing to work together in the sporting environment, and social cohesion is how well you get on away from the sporting field. Task cohesion is the most important factor but it can be boosted by social cohesion.

### *Temperature*

Extremes of temperature can have a negative effect on performance due to the effect on the physiological systems of the body. Heat can cause excess sweating, dehydration and heat exhaustion, while cold can make it difficult for the cardiovascular and muscular systems to achieve the correct temperature for optimal functioning.

### *Time of Day*

The time of day can influence performance in terms of nutritional and fatigue status. In the morning before a person has eaten they will be in a dehydrated state with low blood sugar and in a far from optimal state to perform effectively. Depending upon when they eat and drink they will fluctuate in terms of their nutritional status through the day. Other physical factors can change through the day. Mobility and flexibility will be lowest in the morning due to the inactivity of the joints and the lack of synovial fluid that has been excreted into the joint.



## **Quick quiz 1**

Decide whether each of the following constructs for a netball player should be categorised as technical (T), physiological (Ph) or psychological (Ps)

- confidence
- passing
- speed
- aerobic fitness
- blocking
- arousal control
- aggression control
- movement
- power
- shooting.

## Student activity 11.1



P1
P2
M1
D1

### Example of a performance profile

#### CASE STUDY: WILLIAM

William is a 16-year-old rugby player who plays number 8 for his college U17 team. He is a very promising player, but has only been playing for about 18 months and is still learning about the game. To help him to improve his performances he has agreed to have a performance profile constructed. The results of the performance profile are shown below:

	1	2	3	4	5	6	7	8	9	10
Tackling							7			
Strength				4						
Power			3							
Rucking			3							
Aggression control		2								
Concentration			3							
Passing								8		
Aerobic endurance							7			
Arousal control		2								
Scrummaging					5					

#### Part 1

1 Describe the performance profile for William.

P1

2 Explain the performance profile for William.

M1

3 Analyse the performance profile for William.

D1

#### Part 2

Describe how the following factors may influence performance:

P2

Factor	How it may affect performance
Diet	
Motivation	
Confidence	
Group dynamics	
Temperature	

## 11.3 Analysing Sporting Performance



### Performance Profile Assessment

The performance profile relies on the respective viewpoints of the athlete and coach. It is also useful to gather information to be used in rating the score for each construct. The opinions of the athlete and coach would be qualitative data, while the information gathered from testing would be quantitative data.

The four aspects of the performance profile could be analysed using the following quantitative data

Technical constructs:

- notational analysis
- tally charts.

Physical constructs:

- multi-stage fitness test
- 40-m sprint

- 1 rep max
- 15 rep max
- sit and reach test
- peak flow test
- skinfold calipers
- T-test.

Psychological constructs:

- questionnaires
- interviews
- observation of behaviour.

Biomechanical analysis:

- video recording
- computer packages.

### Notational analysis

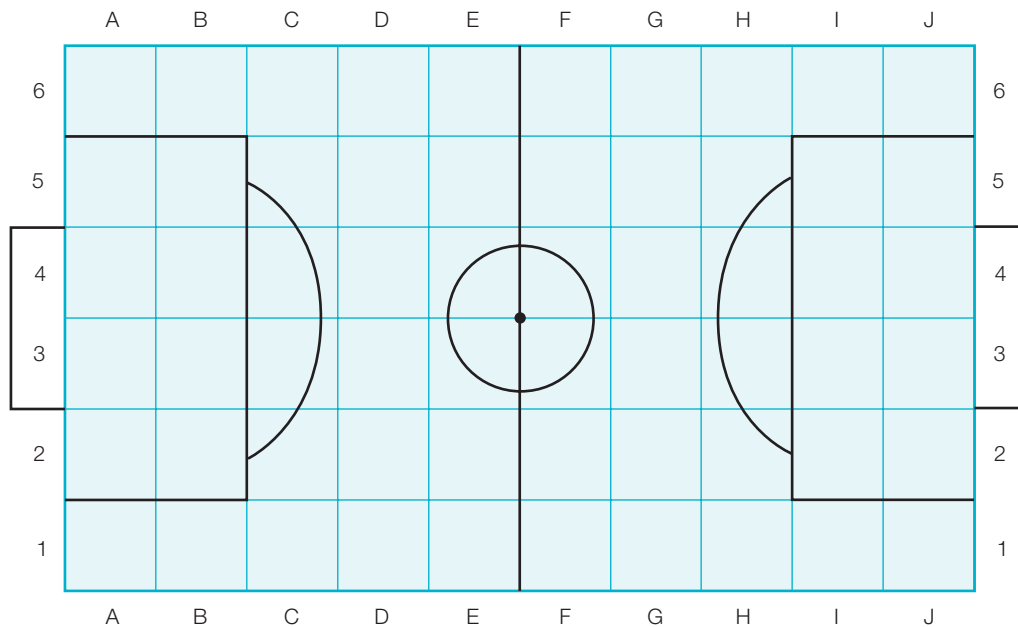
Notational analysis is the tracking of the actions of an individual performer through the course of a game or match to see the frequency with which they perform a particular technique. It can be done through a computer package or by hand using tally charts.

A tally chart for football is reproduced in Figure 11.5:

Tally chart: football		
Skill	Successful completion	Unsuccessful completion
Short-range pass (< 5m)		
Medium-range pass (5–15m)		
Long-range pass (> 15m)		
Dribble		
Short-range shot (< 6m)		
Medium-range shot (7–18m)		
Long-range shot (> 18m)		
Tackle		
Block		
Defensive header		
Attacking header		
Throw-in		
Free kick		
Corner		
Penalty kick		

Fig 11.5 A tally chart for football





**Fig 11.6** Football pitch sectioned into areas

Passing record		
Skill	Successful completion	Unsuccessful completion
Short-range pass (< 5m)	G5–F5 D3–D2 I6–J5	F4–F3 C3–C4
Medium-range pass (5–15m)	G2–E4 C6–A6 H1–F3	D5–B4
Long-range pass (> 15m)	I4–E3 C1–B5	F6–D1 I5–D3 F1–C4

**Fig 11.7** A passing record for football

This information is of limited value as you also need to look at where this action occurs. This can be done by sectioning the area of play (see Figure 11.6) and giving each area a label. This will elicit more valuable information.

This can be done with a cricket pitch, tennis or netball court. You can then track where each type of skill occurs and its outcome.

An example of tracking the passing of a footballer is also reproduced in Figure 11.7.

The uses of notational analysis are to:

- identify individual strengths and weaknesses
- analyse all the actions of a player
- build up information to rate score on performance profile
- develop an action plan to improve performance.

## Student activity 11.2



60 minutes

P3

M2

D2

**Task**

- 1 Select an athlete and undertake a performance profiling assessment in the following way:
  - Introduce the process of performance profiling.
  - Explain that you will be assessing technical, physiological and psychological aspects of their performance.
  - Ask them to come up with the 10 most important factors that contribute to their performance.

- Ask them to rank the 10 factors in the order of importance with the most important at number 1.
  - Ask them to give themselves a score of 10 (where 10 is the best they could possibly be) for each of the factors.
  - Fill in the performance profile.
- 2 To achieve M2 perform this profile without any help from your tutor.
  - 3 To achieve D2 analyse the performance profile.

## 11.4 Providing Feedback on Performance

P4

M3

It is impossible for anyone to improve or change unless they receive feedback.

### Key term

**Feedback:** information about performance.

It has no value judgement attached to it as it is not positive or negative. It is simply information. The information is provided and the athlete has the choice of doing something about it or not.

### Types of Feedback

There are different categories of feedback regarding its timing and the type of feedback given. They are:

- knowledge of performance and results
- immediate and delayed
- internal and external
- concurrent and terminal.

#### Knowledge of Performance and Results

Knowledge of performance (KP) is information regarding how well skills were performed in a technical sense and will involve qualitative judgements. Knowledge of results (KR) is information regarding the outcome of the skill – whether the action produced success or failure – this is a quantitative judgement. It is possible to perform a skill well (KP) and have a negative outcome (KR) or have a poor performance (KP) and a positive outcome (KR).

It is generally regarded that experienced performers are more interested in knowledge of performance, while novices are more interested in knowledge of results.

#### Immediate and Delayed

Immediate means that the feedback is given immediately after the skill has been performed, while delayed means feedback is provided at a time after the event – this could be a day or an hour later. The coach needs to consider the impact that the feedback will have on the athlete's motivation and how important it is for the athlete to receive it. Once they have considered those two questions they can decide when to give the feedback.

#### Internal and External

Internal feedback is generated within the body of the athlete. As you perform a skill you will feel whether you have performed it correctly or not due to the nervous pathways you have set down to produce the movement and judge its correctness. As we hit a tennis ball we feel whether we have struck it sweetly or not. External feedback is provided by an external party, who observes the performance. For example, the coach will observe the performance of the skill and offer feedback as to how it looked and how effective it was. External feedback may also be provided by using camcorders or other recording devices.

#### Concurrent and Terminal

Concurrent means literally 'running together'. This type of feedback is provided during the performance of the skill in terms of how it feels and often the outcome as well. Concurrent feedback is usually internal in nature and clearly immediate in when it is provided. Terminal means 'at the end'. This type of

feedback is provided at the end of the performance. It is usually external and is always delayed.

## Delivering the Feedback

Once the coach has decided on what feedback is necessary to address the individual's strengths and areas for improvement, they will need to decide when, where and how to deliver it. How the feedback is received depends upon how it is delivered.

### Structure

When giving feedback you should use the sandwich technique. Feedback should have this structure:

- tell them what they are doing right
- tell them what they need to improve on
- tell them something else they did right.

This means that the feedback ends on a high note and the athlete understands what needs to be improved.

### Non-verbal Communication

Feedback can be given visually and through gestures as well as verbally. The use of facial expressions, posture and hand gestures will convey more than the actual words used. The delivery of the message should match the message being given. This is called being 'congruent'. Also, gestures such as a pat on the back or a hand on the arm will convey information that cannot be imparted in words.

### Avoiding Negative Approaches

Avoid any negative approaches or comments.

- Intimidation: 'If you don't improve you can find a new coach.'
- Sarcasm: 'My granny could have caught that!'
- Physical abuse: 'Unless you listen to what I say, you will be doing press-ups.'
- Guilt: 'You should be ashamed of yourselves the way you played out there. It was gutless and you let your supporters down.'

### Private and Confidential

Ensure feedback is given in a private area as it may be sensitive and is not relevant for anyone else.

### Focus on Behaviour

Focus on the behaviour rather than identity. This is the difference between a coach saying 'You are an aggressive person and this is not acceptable' and 'Your aggressive actions are not acceptable.' One addresses the behaviour, which can be changed, and the other addresses the identity of the person, which is long term and relatively stable.

## Using the Feedback Provided

Once the feedback has been received and processed by the athlete, they have to decide how to use the information. It may be used in the following ways:

- to set SMART targets combining short-, medium- and long-term goals
- to develop or change a training programme to include technical, physiological and psychological components of performance
- to inform the process of performance profiling and assessment of scoring the individual constructs.

## Key learning points 2

- Feedback is information about an individual's performance.
- Feedback can be categorised in two ways: knowledge of performance (KP) and knowledge of results (KR). KP is information about how well the skill was performed and KR is information about the outcome of the skill.
- Immediate feedback is given as soon as the skill has been performed, while delayed feedback is given at a period after the performance.
- Internal feedback is derived from sources inside the body and external feedback comes from sources outside the body.
- Concurrent feedback occurs as the skill is being performed and terminal feedback occurs after the completion of the skill.
- When providing feedback keep in mind the following:
  - using the sandwich approach of positive/negative/positive
  - providing it visually as well as verbally through body language
  - avoiding sarcasm, intimidation, abuse and guilt
  - ensuring it is delivered in a private area
  - focus on behaviour rather than identity.

## Q Quick quiz 2

Match the type of feedback to its correct definition.

Type of feedback	Choice of definitions
Knowledge of results	Information given immediately after a skill has been performed
Knowledge of performance	Information generated from sources within the body
Immediate	Information about the outcome of the skill
Delayed	Information generated from sources outside the body
Internal	Information about how well skills are performed
External	Information provided at a period after the skill has been performed

### Student activity 11.3



30 minutes

P4

M3

#### Task

Based on the performance profiling exercise that you conducted in Activity 11.2 provide feedback to your selected athlete in the following way:

- Make written notes about the strengths and areas for improvement for your selected athlete

- Conduct a feedback session with your selected athlete.

To achieve M3 this feedback should be provided independent of tutor support.

## 11.5 The Purpose and Resources Required for Analysing Different Levels of Sporting Performance

P5

Sport England has identified four different levels of sporting performance, as follows.

### Foundation Level

At foundation level focus is on the participants learning and understanding basic movement skills and developing a positive attitude to physical activity. This level is concerned with giving school children positive and meaningful experiences of sport.

### Beginner or Participation Level

At participation or beginner levels the participants will be taking part in sport for a range of reasons, such as health, fitness and social. They may also be

attracted by the competitive aspects of sport. This level of participation would involve out-of-school sports teams and Saturday league players.

### Performance Level

At performance level the participants will be active in improving standards of performance through coaching, competition and training. This would involve the participants playing at county or national standard.

### Elite or Excellence Level

Elite and excellence levels involve the participants reaching national standards of performance up to Olympic or world-class performances.

## Purpose of Analysis and Resources Required

### Foundation Level

At this level the emphasis is on fun and enjoyment, and learning the basic skills and techniques. Analysis will be limited to identifying the strengths

and weaknesses of the children and giving them feedback to improve their enjoyment of the sports. The resources required are limited to support from teachers and parents.

### ***Beginner Level***

At beginner level there is an emphasis on developing techniques and improving weaknesses along with developing strengths. This is a point where talent may be assessed for further development through coaching and physical training. Analysis is again done in a fairly informal manner through recommendations or even talent scouting.

### ***Performance Level***

Analysis starts to become very important at this level as it is about achieving standards of performance to reach county or national level. Analysis will be conducted to:

- identify talent
- form the basis for squad selection at county and national level
- assess current level of performance
- identify strengths and weaknesses
- assess fitness level and health status
- inform the process of goal setting.

In terms of resources required there is a need to put in time and effort on behalf of personnel. This is a key stage in moving people towards becoming athletes and to ultimately developing elite potential. Equipment required will include fitness testing equipment, sport science facilities, expertise from sport scientists and time devoted to each individual.

### ***Elite Level***

At elite level every aspect of an athlete's performance is analysed to the smallest degree as they seek to gain all the advantages they possibly can to improve their chances of success. At this level, aspects of health, fitness and performance are analysed on a daily basis. Indeed, the athlete may be professional or training

on a full-time basis. The purpose of analysis at this level is to:

- assess current health and fitness status
- identify strengths and weaknesses
- assess current level of performance
- inform the process of goal setting
- identify any future issues or problems.

As athletes at this level may have contact with their support team at facilities such as a national sports centre, they are heavily dependent on resources. These resources are human in terms of sport scientists with various expertise, and physical resources for assessing fitness levels and analysing skills and techniques.

## Key learning points 3

- At foundation level focus is on the participant's learning and understanding basic movement skills and developing a positive attitude to physical activity. Analysis is provided at this level to help participants improve their skills.
- At participation or beginner levels the participants will be taking part in sport for a range of reasons, such as health, fitness and social and competitive reasons. Analysis is used at beginner level to improve performance and identify talent.
- At performance level the participants will be active in improving standards of performance through coaching, competition and training. Analysis is provided to assess current level of performance and how to improve it, as well as identify talent to move to a higher level.
- Elite and excellence levels involve the participants reaching national standards of performance up to Olympic or world-class performances. Analysis is done at elite level to identify any area where the athlete could improve so they can compete at the very highest level.

## Student activity 11.4



30 minutes

P5

### Task

Fill out the following table to explain the purpose and resources required for analysis at two different levels of sport.

	Participation level	Elite level
Purpose of analysis		
Resources needed		

### Useful websites

[www.brianmac.co.uk/eval.htm](http://www.brianmac.co.uk/eval.htm)

Provides details of how to evaluate and test sports performance

[www.pponline.co.uk/encyc/sports-performance-analysis-coaching-and-training-39](http://www.pponline.co.uk/encyc/sports-performance-analysis-coaching-and-training-39)

Article detailing how sports analysis can help coaching and training

### Further reading

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