TOPIC 8
Skill and performance

OVERVIEW
8.1 Stages of skill acquisition
8.2 Characteristics of the learner
8.3 The learning environment
8.4 Assessment of skill and performance
8.5 Topic review

OUTCOMES
In this topic students will:
• explain the relationship between physiology and movement potential
• explain how a variety of training approaches and other interventions enhance performance and safety in physical activity (H8)
• explain how movement skill is acquired and appraised (H9)
• design and implement training plans to improve performance (H10)
• devise methods of gathering, interpreting and communicating information about health and physical activity concepts (H16)
• select appropriate options and formulate strategies based on a critical analysis of the factors that affect performance and safe participation. (H17)
Skill is the ability to consistently perform movements with control and precision. The acquisition (or gaining possession) of skill is a gradual developmental process that requires that our cognitive (thinking) processes work with our physical abilities to learn how to perform movements that previously were unfamiliar to us. Part of the physical learning process is the gradual development of our sensory awareness, as our ability to execute movement changes from being a conscious to an unconscious effort.

The pace of skill acquisition varies from one learner to another. Underlying problems such as lack of coordination, poor acceleration or slow reflexes may make progression from basic to movement mastery slow and possibly difficult. Again, inherent (inherited or inbuilt) and other factors such as age, sex, ability, motivation, environment and our cognitive processes markedly affect the rate of skill acquisition. Understanding factors that influence skill acquisition is an important step in performance improvement.

8.1 Stages of skill acquisition

The learning of motor skills has been categorised into a three-stage process:

- the cognitive or planning stage
- the associative or practice stage
- the autonomous or automatic stage.

8.1.1 Cognitive stage

The first stage of skill learning is the cognitive stage. Cognitive refers to mental processing of information, thinking and understanding. The fundamental requirement here is that the athlete gains an understanding of the task required. This necessitates knowing what to do and an insight about how to do it. Conceptualisation — or the generation of clear mental pictures of the task — is essential for good movement reproduction. Demonstrations, videos and information highlighting the important points can help guide the learner through the skill. However, coaches must be careful to avoid ‘information overload’, which would confuse the learner.

It is expected that the learner will encounter problems, the number and magnitude of which will depend on the difficulty of the skill. The learner may experience error, awkwardness and some disorientation. Thus, learners must receive continuous feedback or information on their progress. If they experience much difficulty, the skill could possibly be broken into smaller movements for practice. During this stage, the learner should experience some success. All positive learning should be reinforced and encouraged. Many coaches give drills at this point to improve the learner’s coordination and feel for the desired movement.
Rates of progress through the cognitive stage vary from one individual to another. Much depends on how the sequences of skill building are organised, both physically and in the mind of the learner. Depending on the difficulty of the skill (or complexity of the task), it could be learned in anything from a few minutes to a much longer period. Some difficult skills (such as handstands and somersaults) may never be mastered by some people.

8.1.2 Associative stage
The second stage of skill acquisition is the associative stage, which is identified by an emphasis on practice. Associative means connecting or linking ideas. The learner, having acquired an idea of what the skill is, needs to repeat the movement to enhance the synchronisation of their mind and muscles. Errors still occur, but are smaller and less frequent than in the cognitive stage. Feedback is again essential to improve the skill, which the learner repeats frequently in practice. A sense of fluency or smoothness develops as the learner’s kinaesthesia (sense of movement) improves.

Practice improves the way the skill is performed. The learner eventually experiences some success; for example, a basketballer gains assurance as he/she develops the ability to dribble with left and right hands. These successes are felt more frequently with additional practice and feedback. Gradually, the learner feels more at ease as their confidence increases.

Learners can remain at this stage for a long period, even years. Some may never progress to the next stage. However, given sufficient practice, most reach the level at which the skill execution is reasonably automatic. But this does not imply perfection, because performances at the autonomous level vary in their quality.
8.1.3 Autonomous stage

The third stage of skill acquisition is the autonomous stage, which is characterised by the ability to automatically execute the skill. Execution of the movement is now properly sequenced and performed instinctively. The performer has consolidated the many discrete skills (commonly called subroutines) that comprise the action. Their movement has a characteristic fluency as the subroutines sequence and blend in aesthetically pleasing motions. This is referred to as temporal patterning. The movement looks good because it is efficient, with the muscle groups working in order and producing only the necessary movements at the required time.

The most important feature of performers in the autonomous stage is that they are able to attend to other cues while giving little thought to how to perform the skill. In a netball game, for example, the problem is not how to make a pass, but who to pass to and what type of pass to make, considering the position of the defence. Practice is still important during the autonomous stage, but mostly involves simulating the competition situation. Unless specifically practised to improve technique, training sessions for an athlete at this stage should incorporate pressure drills. This helps the athlete adapt their skills to the real performance.

| TABLE 8.1 The three stages of skill acquisition
<table>
<thead>
<tr>
<th>Cognitive stage</th>
<th>Associative stage</th>
<th>Autonomous stage</th>
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</thead>
<tbody>
<tr>
<td>Identified as the basic or understanding stage of skill learning</td>
<td>Identified as the intermediate or practice stage of skill learning</td>
<td>Identified as the advanced stage at which skills are performed reflexively</td>
</tr>
<tr>
<td>Focus on what to do</td>
<td>Focus on how to do the skill</td>
<td>Focus on other tasks</td>
</tr>
<tr>
<td>Frequent large errors</td>
<td>Some errors but not so large</td>
<td>Few errors</td>
</tr>
<tr>
<td>Learner is often unable to recognise error.</td>
<td>Learner is able to recognise errors.</td>
<td>Performer is able to detect and correct errors as they occur.</td>
</tr>
<tr>
<td>Learner needs to see, feel and experience the movement.</td>
<td>Learner needs to practise.</td>
<td>Performer needs to adapt the movement to pressure situations.</td>
</tr>
<tr>
<td>An exploratory stage.</td>
<td>Kinaesthetic development improved through practice</td>
<td>Movements rehearsed under varying conditions</td>
</tr>
<tr>
<td>Demonstration is the best means of communication.</td>
<td>Demonstrations are important.</td>
<td>Demonstrations are only essential to refine particular movements.</td>
</tr>
<tr>
<td>Learners must identify subroutines.</td>
<td>Emphasis is on temporal patterning. The player will know the subroutines and is competent in assembling them into the required skill.</td>
<td>Temporal and sequential patterning of subroutines is automatic.</td>
</tr>
<tr>
<td>Slow learning speed and inefficient movement</td>
<td>Moderate speed and reasonably efficient movement</td>
<td>Speed and efficiency that relate to the specific requirements of the situation</td>
</tr>
<tr>
<td>Support from teaching aids (demonstrations, pictures, videos, etc.) is required to enhance visualisation of the skill. The teaching focus is conceptualisation.</td>
<td>Further improvement requires practice of set patterns of movements in controlled situations.</td>
<td>Improvement requires manipulation of the environment (for example, increased game pressure) to ensure the skill is able to be reproduced under varying conditions.</td>
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</tbody>
</table>
8.2 Characteristics of the learner

The speed with which learners are able to acquire certain motor skills depends on a number of factors, of which most are inherent features. These alter considerably from one person to another. Variations in age, height, muscle fibre composition, sex and weight, to mention a few, mean that any two people will not acquire similar skills at the same pace. Some people are better at jumping than running; others display more talent in gymnastics than in athletics, and so on. Our differences make us unique, and we must take them into account when learning motor skills. Some characteristics of learners that affect the rate of learning are personality, heredity, confidence, prior experience and ability.

8.2.1 Personality

Personality refers to an individual’s characteristic way of behaving. It develops as a result of the individual’s infinite social interactions and learning experiences throughout life.

The manner in which personality blends with learning is often seen in an athlete’s behaviour. Coaches describe athletes in terms of observable traits such as consistency, reliability, level of motivation and ability to express feelings. From a motor learning point of view, certain aspects of personality tend to be more favourable with certain learning environments.

Elite coaches tend to recruit and develop not only those with physical talent, but also those who possess positive learning attributes. These attributes include such personal characteristics as cooperativeness, willingness to listen, determination, enthusiasm, dedication, level of motivation, aggressiveness, and willingness to take risks and to learn. Learners whose personality reflects positive ways of behaving are more receptive to instruction and advice, more cooperative in performing set tasks and more helpful in creating a productive learning environment.
8.2.2 Heredity

Individuals are endowed with certain characteristics inherited from their parents. These are unchangeable and limit the dimensions of their potential. Hereditary factors, which refer to genetic characteristics, determine the ‘ceiling’ for performance. They limit how fast we can run, how high we can jump and possibly our ideal position in a sports team (based on build and speed). The environment determines if we can reach the limits set by heredity.

The following important hereditary characteristics influence success or otherwise in specific athletic events.

- **The relative percentage of fast-twitch to slow-twitch muscle fibres.** Athletes with a higher percentage of fast-twitch fibres are naturally more suited to sprint and explosive events, whereas those endowed with slow-twitch fibres tend to be more successful at endurance events.

- **Somatotype.** The tendency towards ectomorphy (linearity), mesomorphy (muscularity) or endomorphy (roundness) determines an individual’s suitability for many activities. Ectomorphy is favoured for high jumpers, for example, whereas mesomorphy is more favoured for netball centres and lightweight boxers.
• **Gender.** Higher levels of the hormone testosterone in males give them the potential to make greater increases in strength and power than females. For this reason, most sports have separate competitions for each gender.

• **Height.** Differences in height (and weight) provide considerable physical and biomechanical advantages to some players and make the learning and execution of required skills a less difficult process.

• **Conceptual ability.** The ability to visualise a movement and make it materialise is a significant factor, particularly in the first stages of learning.

An important point to remember is that the ability to learn a skill may or may not be related to success in competition. For example, a small, stocky person may readily learn to high jump using the correct technique, but may be unsuccessful in competition because other competitors are taller, leaner and better suited to jumping. Thus, skill learning and execution may be successful and rewarding, but may not lead to competitive success.

**Inquiry**

**Characteristics of the learner**

Read the snapshot ‘The mystery and myths of muscles’, then discuss the importance of hereditary factors to success in athletic events.

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**SNAPSHOT**

**The mystery and myths of muscles**

For years it was axiomatic [well understood] that performance differences were linked to muscle composition. It was long believed that muscles had two types of fibres — Type I, or slow-twitch fibres, which contribute to endurance; Type II, or fast-twitch, which are constructed for power movements, such as leaping or sprinting. Sprint athletes may have 75 per cent or more fast-twitch fibres, whereas distance runners usually have 75 per cent or more slow-twitch fibres. Dozens of studies have documented that whites on average ‘naturally’ have a higher percentage of slow-twitch fibres than West African blacks, who generally have more fast-twitch fibres. So what is the significance of these differences?

Fibre distribution appears to be determined more by genetics than the environment. It’s estimated that 40 per cent of the phenotypic variance of fibre type is due to environmental influences such as exercise, whereas 45 per cent is associated with genetic factors (the remaining 15 per cent is due to sampling error). Although physical activity can improve fitness, it cannot alter a person’s biological endowment.

But scientists have also come to understand that the fast-twitch/slow-twitch model is too simplistic. There are, in fact, two types of fast-twitch fibres, one more metabolically efficient. Training can convert the less metabolically efficient fibres into more efficient ones — for instance, when trained athletes run so fast that they go into severe oxygen debt, forcing the muscles to use oxygen more efficiently. However, training cannot significantly convert fast-twitch fibres to slow-twitch ones, or vice versa, although people do gradually and permanently lose fast-twitch muscles as a result of ageing.

Just how crucial is endowed fibre type in athletics? Geneticist and exercise physiologist Claude Bouchard, known as a guru on muscles and metabolism, and exercise biochemist Jean-Aimé Simoneau, colleagues at Laval University in Quebec City, addressed that issue by comparing French-Canadian and West African students. Using long needles inserted into the thighs of test subjects, Bouchard’s team extracted tiny sections of
fibres (which look to the naked eye like pieces of raw meat). They were chemically treated to reveal metabolic differences, put on a glass slide and slipped under a high-powered microscope, where they appeared as a collage of tiny red and white crocodile scales. The African subjects, by a ratio of approximately two to one, had more of the larger fast-twitch fibres. The researchers concluded that the force-generating capacity of Type II muscle fibres at high velocity, the speed and tempo of movements, and the capacity of an individual to adapt to exercise training are all genetically influenced.

Scientists studying the debilitating effects of muscular dystrophy may even have stumbled upon a 'smoking gun' that bolsters the genetic case for population-linked differences in sprinting capacity. While searching for a gene responsible for muscle weakness caused by the disease, researchers at the New Children’s Hospital in Sydney found that 20 per cent of people of Caucasian and Asian background have what they affectionately called a 'wimp gene', a defective gene that blocks the body from producing a-actinin-3, which provides the explosive power in fast-twitch muscles.

Meanwhile, samples drawn from African Bantus, specifically Zulu tribal members, showed that only 3 per cent had the wimp gene. The discovery could explain why ‘some people train for ages but remain 80-pound weaklings, while others develop muscles very quickly’, said the team leader, Dr Kathryn North, head of the Neurogenetics Research Unit. She and her colleagues speculate that the need for the ‘speed gene’ is dying out because the speed to hunt animals or flee from enemies is no longer necessary for survival — although it certainly helps in sprinting.

The genetic evidence underscores what we find in athletes. Even though fibre composition can significantly affect physical performance, a favourable composition is not sufficient by itself to ensure high performance. Since endurance is only about 25 per cent inherited, training plays an integral role — but more so in blacks than whites. Experiments show that with only a modest amount of training, blacks can experience an explosive rise in exercise capacity, while even with far more effort whites don’t improve nearly as much.

In contrast, scientists believe that no amount of training can break through genetically imposed, inherited limits on anaerobic capacity — the ability to sprint and jump. Thus, although fibre type alone does not itself guarantee a champion, if an athlete does not have a certain proportion of fast-twitch muscles, he or she can’t hope to be a champion sprinter or jumper. In practical terms, this suggests that sprinters are born, not made.

Source: Extract from J Entine, Taboo: Why Black Athletes Dominate Sports and Why We Are Afraid to Talk About It.

8.2.3 Confidence

**Self-confidence**, that is, a firm belief, is critical not only to improvements in skill acquisition, but also to the performance of many tasks faced in everyday living. Confidence develops from experiencing success in learning situations. Incidents that result in successive failures may destroy confidence (unless presented as positive learning opportunities).

Confidence unlocks energy and creativity. It releases the power of belief — the notion that something worthwhile can be achieved through perseverance and effort. Furthermore, confidence underpins the collaboration process with coaches and other learners. Confident people are able to help others as well as themselves. Confident learners approach skill learning situations with feelings of being able to rise to the challenge and that the outcome will be favourable regardless of difficulty.

Self-image is a big part of confidence and is powerful in governing our behaviour. Coaches who use skills practices or drills that make it difficult for a learner to achieve can contribute to the learner’s development of negative feelings and doubt in their own ability. Coaches need to develop drills and
strategies that are, and that make achievement progressive, gradual and within one’s ability level. Positive achievement enhances confidence, nurtures self-image and provides the foundation for future skill building.

8.2.4 Prior experience

It is often easier to learn a new skill if similar movements have already been successfully acquired. This prior experience — an experience linked to the influence of an already learned task on one to be acquired — has the potential to accelerate the learning process. Some suggest that transfer of learning is an important reality in the acquisition of new skills. Others suggest that the amount of transfer depends on the learning situation and many other variables such as the learner’s perception or ability to make connections between the two.

In a group situation, learners will be quite diverse in terms of background experience. Some may find lateral transfer — that is, transfer from one task to another similar task (for example, from backhand in squash to backhand in tennis) — relatively easy. More difficult may be vertical transfer, which is mastering a lower order task as a prerequisite for something much more difficult within the same activity. For example, how important is having learned the dolphin kick using a kickboard to learning butterfly swimming?

The degree to which prior experience influences skill acquisition and ultimately performance is variable among learners. While not measurable, we see prior experience in a good basketballer quickly adapting to netball, a batsman in cricket to golf or a gymnast to diving. It is evident that basic motor skills such as coordination, balance, agility and speed are systematically developed generally through game based activity, club sports and school physical education programs. It appears that these influences contribute significantly to a learner’s general development and represent a platform for building further improvement.

8.2.5 Ability

Ability is seen in the way in which an individual is able to learn, process and implement new skills. Ability incorporates a range of factors, such as sense acuity (or sharpness), perception, reaction time and intelligence, which combine to allow the individual to do readily what is intended. Good sense acuity, for example, enables the individual to gather cues from instructional situations quickly.
Learners with good sense acuity ‘grasp’ key concepts, ideas and movements easily, and move through the early stages of learning promptly.

Some learners possess an ability to react quickly to specific stimuli. This is a considerable advantage in contests such as track events in which response time to the sound of the gun can mean the difference between winning and losing. Others possess an ability to readily comprehend practical tasks, solve problems, generate solutions and make rational decisions in task application. Such talents may be useful in captaincy roles and other organisational positions.

**Inquiry**

**Influence of learner characteristics on skill acquisition**

Draw an enlarged copy of the flow diagram below into your workbook. In the first box, identify the characteristics of the learner. Use the middle box to suggest how these characteristics might impact on skill acquisition. Use the third box to imply how all these factors affect performance.

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**studyon**

Core 2  Question 4  Topic 1  Concept 2

Characteristics of the learner  Summary screen and practice questions

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254  HSC CORE 2 Factors affecting performance
8.3 The learning environment

The learning environment refers to everything outside the learner and embraces the skill itself, the situation in which it is practised, information from coaches and even the influence of the surrounding weather conditions. The environment can have a positive or negative impact on the learning process.

8.3.1 The nature of skill

All skills have observable characteristics, so can be grouped according to specific criteria. Skills are commonly classified as open or closed; gross motor or fine motor; discrete, serial or continuous; and self-paced or externally paced. Most skills fit a number of classifications.

Open and closed skills

Open skills occur in an environment that is unpredictable and frequently changing. Many skills (particularly those associated with team games) are described as open skills as a result of where they are learnt. These are executed in unstable environments.

Uncertainty about how to perform the skill can be due to such factors as changing weather, a player-affected surface (such as a cricket wicket that is breaking up) or even the use of unconventional tactics in a team game. The outcome is that players need to modify their techniques to adapt to the instability. Experienced players have an advantage in such situations because they are able to draw on knowledge from past experiences. However, open skills can be considerably difficult for learners, causing distraction, indecision and even annoyance. This may contribute to inattention and loss of focus.

Closed skills occur in an environment that is stable and predictable. A contrasting environment is evident where closed skills are practised. The closed environment is much more conducive to skill learning because the learner is not distracted by other factors. Skills performed in a closed environment can be planned well in advance or can be made to fit the predicted environmental setting. Delivering the ball in tenpin bowling is an example of a closed skill because the environment (the bowling lane, ball, pin placements and weather conditions) are the same each time the movement is executed. However, if a changing environment is part of the competition event, then learners need to be gradually exposed to it in practice.

Few skills fit perfectly into open or closed categories. Most can be placed on a continuum that illustrates a progression from closed to open (figure 8.10).

FIGURE 8.10 A continuum for illustrating open and closed skills

<table>
<thead>
<tr>
<th>Closed (stable)</th>
<th>Open (unstable)</th>
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FIGURE 8.11 Surfing is an example of an open skill due to the unpredictability of the environment.
**Inquiry**

Open and closed skills

Draw a continuum similar to the one in figure 8.10. Place the following skills at the positions you feel are appropriate on the continuum.

(a) putting in golf  
(b) tackling in football  
(c) surfing  
(d) weight-lifting  
(e) indoor trampolining  

Justify your decisions.

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**Gross motor and fine motor skills**

**Gross motor skills** require the use of large muscle groups for execution. They are commonly found in team games and many competitive and recreational activities such as bushwalking and skiing. Examples of gross motor skills are running, leaping, vaulting, diving, tackling and surfing.

**Fine motor skills** require the use of only small muscle groups to perform the movement. They are found in activities that require finesse and limited movement. Examples of fine motor skills are typing, tying shoelaces and writing. Some isolated movements — such as catching in cricket, playing darts, serving in table tennis and putting in golf — are examples of fine motor movements found in sports. The execution of each of these movements requires precision and exactness, controlled by the smaller muscle groups.

As with open and closed skills, fine motor and gross motor skills rarely fit a single classification, and often can be placed along a continuum (see figure 8.12).

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**FIGURE 8.12** A continuum for illustrating gross motor and fine motor skills

<table>
<thead>
<tr>
<th>Fine motor skills (small movements)</th>
<th>Gross motor skills (large movements)</th>
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**FIGURE 8.13** Examples of gross motor and fine motor skills can sometimes be found in the one sport. Examples in cricket are batting and bowling (gross motor) and catching the ball (fine motor).
Inquiry
Gross motor and fine motor skills
Draw a continuum similar to the one in figure 8.12. Where would you place the following skills:
(a) archery
(b) swimming
(c) juggling
(d) throwing
(e) goal shooting in netball?
Justify your decisions.

Discrete, serial and continuous skills
Skills can be classified as discrete, serial or continuous according to where they begin and end. Discrete skills have a distinctive beginning and end that can be identified. An example of a discrete skill is a forward roll: it begins with the placement of the hands on the mat, and finishes following a roll to the feet.

An example of a serial skill is the place kick in football, as illustrated in figure 8.14. Serial skills involve a sequence of smaller movements that are assembled to make a total skill. Here, a number of discrete skills (forming a mound, placing the ball, moving back, moving forward, kicking the ball and following through) are assembled to form a larger skill. A player in the beginning stages of learning the place kick would need to focus on each of these discrete movements separately. Even skilled players may need to break the serial skill into discrete movements to focus on a particular aspect that is causing concern.

Some skills are repetitive and may appear ongoing and unbroken within a particular period. These are described as continuous skills, which have no distinct beginning or end. Examples of continuous skills are swimming, jogging, rowing, skiing and rock climbing. The length of these activities is unspecified. Again, discrete, serial and continuous skills can be categorised on a continuum (figure 8.15).
Inquiry
Discrete, serial and continuous skills
On a continuum from ‘discrete’ to ‘continuous’, identify where you would place the following skills:
(a) canoeing
(b) trail-bike riding
(c) sailing
(d) performing a vault in gymnastics
(e) throwing a javelin
(f) performing a gymnastics routine.
Justify your decisions.

Self-paced and externally paced skills
Pacing refers to the performer’s control over the timing of skill execution. Some skills are self-paced while others are externally paced.

Self-paced skills are movements for which the performer determines the timing and speed of execution. Examples of self-paced skills are kicking a football in practice and serving a tennis ball. In each case, the performer determines the time and pace of execution. With externally paced skills, factors external to the performer set the time for execution of the movement. Examples of such skills are dancing and rhythmic gymnastics, because music requires the performer to move in accordance with its rhythm and tempo.
Inquiry
Self-paced and externally paced skills
1. Identify:
   (a) five self-paced and
   (b) five externally paced skills.
2. Explain why your selections fit these classifications.

FIGURE 8.18 Summary of skill classifications

8.3.2 Performance elements
The performance elements, namely decision making, strategic development and tactical development, are often overshadowed by a focus on teaching and developing skill fundamentals. We sometimes see players demonstrate proficiency in practice sessions, but they are unable to respond successfully to opponents in games because they lack the knowledge, confidence and decision making skills necessary to take advantage of the situation.

While some players appear superior in certain performance elements, such as the ability to ‘read’ a game, others need to develop this capability through practice. Teaching and coaching strategies that emphasise the game-centred approach provide the opportunity to develop performance elements because tactics, moves and game plans can be analysed following planned stoppages in play. Using this approach, players see the relevance of a skill or move because poor execution, the usual cause of stoppage, has drawn attention to it. The analysis is immediate and the feedback instant, with relevance established to that part of the game.
The development of performance elements can be enhanced by the use of technical equipment such as coaching boards, and practical application by way of play drills, small games and match practice to provide experience.

Decision making
Decision making is best improved by having to make decisions in performance-like situations. Of course, decision making needs to be appreciated within the framework of the rules, playing conditions, agreed team strategies and opposition tactics. Productive decision making is best achieved through:

- **observation.** Many coaches use coaching boards and demonstrations to reveal the inner workings of planned strategies to assist learners. They also recommend observation of other players and their movements on the field of play, particularly skilled performers.
- **questioning.** Decision making is improved by highlighting options and having players work through game-like scenarios. For example, when moving objects representing players around on a coaching board, players need to be asked questions like ‘what would you do if this opponent moved here?’ and ‘how do we create a gap between these two players?’
- **whole, part, whole approach.** A game strategy needs to be taught as a whole so players can see the overall plan. Following that, individuals need to learn their specific roles. Learner players should walk through moves initially to acquire the feel of where to be, what to do and when to do it. The build-up to game execution speed needs to be gradual, with emphasis on good technique and correct execution. Finally, the strategy should be assembled and practised against a non-invasive opposition.
- **variation.** During training, it is important to explore variations when rehearsing strategies. By changing the defensive alignment, for example, players are encouraged to explore more innovative and imaginative options.
- **creativity.** A democratic approach to strategic development encourages all players to identify with each problematic situation and solve it as a group. This is preferable to following strict, coach-imposed directions all the time because players like to feel that they can make a worthwhile contribution. Creativity as opposed to ‘paralysis by analysis’ is more productive in developing decision making skills.

Strategic and tactical development
All games players aim to develop proficiency in the development of technical skills, that is, ways of moving the body to perform a physical task. A pass in a game, a lay-up in basketball and a dribble in hockey are all examples of technical skills used in different games. For years, coaches using the traditional approach taught skills in specific practice situations and hoped that players could transfer their learning to game situations. However, factors such as opposition pressure, player movement and a lack of similarity between the practice and game situations (closed to open environment) meant that duplication of the learned skill was often unsuccessful.

The games-centred approach is now much more popular as it focuses on the development of tactical skills within an open environment. Here the emphasis is on decisions and actions of players within the game with the intention of gaining advantage or superiority. While more difficult to structure and teach effectively, tactical skill learning leads to better game performance.

The first step in tactical skill learning is understanding. While it is important to learn
correct technique, it is equally important to know which skill to use and where it fits into the game. This
requires a body of knowledge, self-confidence and some familiarity with the consequences of error.

The second step is to enhance decision making ability. Learning technical skills in isolation requires little
in the way of decision making. However, tactical skill learning encompasses decision making as part of the
process. Players learn to identify relevant cues and variations within game-like situations and apply tactical
options as necessary.

Tactical skills can be taught in many situations such as small grids, limited player games, confined-
space games, 2 on 3 situations and so forth. By manipulating rules, space, time, equipment, numbers and
offensive/defensive structures, the desired learning experience can be replicated. It is up to coaches to design
situations that mimic desired aspects of the game and set up drills where players can develop suitable game-
related movements. If players never practise in a game-like setting, they will never feel confident in the game
itself. Of course, players will make mistakes during the game, but they will realise why they happened and
learn from them. Alternatively, a sequence of the same mistakes in a game could destabilise confidence. During
these small games, it is important for players to ask questions, have input and even suggest solutions. This
encourages players to develop a sense of responsibility for their actions.

Tactical development is built on problem solving. It is about decisions and actions on the pathway to gaining
advantage. It is about error, learning from it and developing creative solutions while in experimental situations.
Observation of others, video analysis and talking to experienced players is important in understanding why a
particular action is appropriate, how to respond to certain situations and how to implement suitable responses.

As tactical skills become functional, strategic development can be enhanced. Strategies are plans of action
that you or your team can use to gain an advantage in a single game or a number of games. Good strategies
have inbuilt options so that if a plan is derailed, there is always an alternative. A common strategy that might
apply in a range of sports involves passing. If you make a pass to a team player, what do you do? Some options
might be to go behind the player to whom you made the pass (wrap in touch), move in a different direction
altogether (create space for the ball receiver) or even move to block the path of a defensive player (screening
in basketball). Strategies involve planning and practice and might need to change according to the opposition.
Strategies become complex as more programmed movements are built in and put to the test. However, players
who have developed technical and tactical skills will have a solid platform on which they can respond to the
constantly varying game environment and confidently adapt to changing situations.

![Diagram](https://example.com/diagram.png)

**FIGURE 8.20** In the game-sense approach, game appreciation is the setting in which tactical
awareness, decision making and skill execution develop.
Table 8.2 shows areas where tactical development may need to take place. It considers the player, fellow team players and the opposition. The questions are typical of those that need to be considered in strategic and tactical development plans.

**TABLE 8.2 Tactical development focus issues**

<table>
<thead>
<tr>
<th>Tactical development area</th>
<th>Team players</th>
<th>Opposition players</th>
</tr>
</thead>
</table>
| Space                     | • How much space can I use?  
                           • Where do I go before the move?  
                           • Is the gap big enough?  
                           • Where do I go after the move?  
                           • Will the player with the ball have enough space? | • How do I confine my opponent's space?  
                           • To where do I move to frustrate my opponent? |
| Force                     | • How much do I apply?  
                           • Have I got sufficient energy to do what I want? | • Is force necessary to achieve my goal?  
                           • Is there a better way if my opponent is bigger? |
| Time                      | • When is the right time to execute a movement?  
                           • How do I create enough time to allow me to do what I want? | • How do I take time away? |
| Direction                 | • Will this take me forward?  
                           • Will the angle squeeze too much space from my fellow players? | • Which direction will cause biggest problems — straight or angled? |
| Myself                    | • Have I got the skills and talent to do this?  
                           • Do I understand what has to be done?  
                           • Am I confident in my ability to pull this off?  
                           • Is it part of the team plan?  
                           • Is the risk worth it? | • Will this help me get the upper hand over my opponent? |
| Other players             | • Where do others fit in?  
                           • Will they understand what I am doing?  
                           • Can they do what I am asking of them? | • Do I need to consider more than my immediate opponent? |

**Application**

**Performance elements**

As a class, choose a game such as touch football or netball where one student who is a capable player could act as coach. Play a game using the game-centred approach. Stop the game at least three times and highlight areas of play that could be improved. Use a game-related drill or walk-through strategy to improve execution of skills, plays or moves during each stoppage.

**Inquiry**

**Evaluating the game-centred approach**

As a group, discuss the following questions.

1. Did the approach assist in decision making?
2. Did players better understand what had to be done using this approach?
3. How could the approach be improved to further develop performance elements?
8.3.3 Practice methods

The learning environment is further affected by the training systems and routines designed to teach particular skills. These are called practice methods.

Massed and distributed practice

Massed practice and distributed practice methods are approaches that coaches commonly use to teach skills more effectively in the available time. Massed practice involves a continuous practice session, with the rest intervals being shorter than the practice intervals. Distributed practice (or spaced practice) involves a broken practice session, with the intervals of rest or alternative activities being longer than the practice intervals.

The choice of these routines depends on the amount of time required to teach a particular skill. Massed practice requires performers to take infrequent breaks between long periods of instruction and skill development routines. An example would be a gymnast learning a handstand, where drilling continues until fatigue or other factors make further practice of limited benefit.

Massed practice works best when performers are:
• highly motivated
• fresh
• unable to attend a number of sessions.

It is often preferable to spread the periods of intensive work more liberally, as with distributed practice. In a distributed practice situation, the gymnast would practise the handstand over a number of sessions, or perhaps on different occasions during the one session. Relief could be gained by either using frequent breaks or alternating between activities.

Distributed practice works best when:
• the performer lacks interest
• the task is difficult
• motivation is low
• the task causes fatigue
• excessive work causes discomfort (for example, heading a soccer ball).
Whole and part practice

While some skills are relatively easy to learn, others such as somersaults and handstands require considerable practice. It is often difficult for learners to conceptualise and integrate the smaller parts that need to be assembled to form a complex skill. For this reason, coaches may decide to use whole practice, part practice or a mixture of both to assist the performer’s learning process. The whole practice method is applied when a skill is practised in its entirety. The part practice method is applied when a skill is broken into smaller components and each discrete subskill (subroutine) is practised separately.

The layup in basketball is an example of a skill that can be taught effectively using either the part or whole method. If using the whole method, the coach would demonstrate and teach the skill as a complete unit. If using the part method, the coach would break the layup into a series of discrete skills:

- dribbling to the basket
- catching the ball and landing on the correct foot
- stepping on to the opposite foot and driving up to the basket
- shooting and landing.

The learner would then practise each movement and assemble them at the end.

Considerable research has been conducted to determine the best method of practice. Results are still largely inconclusive, but the part method is commonly used for teaching both new skills and complex skills. Most researchers feel the method selected should be adapted to the needs and skill level of the learner. Many coaches use a combination of methods, such as whole–part–whole: first, the total skill is demonstrated and practised; second, as difficulties arise, the discrete segments are extracted from the total movement and analysed separately; and third, as the segments are mastered, the skill is reassembled, practised and again rehearsed as a unit.

**FIGURE 8.22** The difference between the whole (left) and part (right) methods of practice

![Diagram showing whole and part practice methods for basketball layup]
Application
Whole and part learning practice
Establish two groups within the classroom. Each group should try to learn how to juggle three tennis balls, throwing each ball from the left to right hand, then into the air and catching it in the left hand. Group 1 will learn the skill as a whole movement, while group 2 will progressively develop the skill, mastering the use of one ball and progressing to three. Allow 10 minutes, then assess each group’s performance.

Inquiry
Comparing whole and part practice methods
1. From your observations in the previous application, which group was the most successful?
2. Why were the learning rates of the two groups different?

8.3.4 Feedback
Feedback is the information provided to the learner about the nature or result of their performance. It constitutes an important role in the learning process because it provides guidance and helps the performer eradicate movement error. The many types of feedback include internal, external, concurrent, delayed, knowledge of results and knowledge of performance.

All learners derive feedback from performing a particular skill and possibly some from other sources such as a coach. The movement may or may not closely resemble the skill as it was taught and demonstrated. If the learner is performing the action for the first time, then there is probably an element of awkwardness evident in the application. Further practice is necessary to improve the learner’s perception of and feel for the skill. A cyclic process of skill refinement continues until the learner is accomplished in the movement or attains a level of competence commensurate with their ability.

The relationship between feedback and performance is important.
• If the action is highly unsuccessful, then feedback should suggest that the learner substitute or replace the action.
• If the action is unsuccessful, then feedback should suggest that the learner modify the action.
• If the action is successful, then feedback should suggest that the learner repeat the action.

Internal (or intrinsic) and external (or extrinsic) feedback
Some feedback is experienced during execution of the skill. Called internal feedback, this information is received through the body’s proprioceptive mechanisms (senses). Internal feedback occurs as a normal consequence of performing a skill. It embodies feelings, together with sensory information such as seeing the ball and hearing the sound of a ball hitting the bat.
Proprioception is made possible by the neuromuscular system sending messages to the brain about how the movement is being performed. It helps us develop a kinaesthetic sense or ‘feel’ for a movement, and eventually to differentiate between skilful application and error.

**FIGURE 8.24** How internal feedback functions

Sense organs receive cues

Information is taken in and interpreted (perception)

Feedback

Information is processed

Response: the skill is used

Some feedback is derived from outside sources during performance of a skill. Called external feedback, this information may take the form of a comment from the coach, applause from the crowd or the result of a game. It is all feedback other than that which occurs as a normal consequence of performing a skill. It includes various forms of external information, such as suggestions from the coach, video replays, judges’ scores and race results. While it may vary in nature, its origin or source is outside the body. A form of external feedback is augmented feedback — supplementary or additional information that is not given immediately the skill is performed, but is used later to illustrate a point. Visual aids such as video replays of performances are examples of external augmented feedback. Forms of external feedback are illustrated in figure 8.25.
**Concurrent (or continuous) and delayed feedback**

The timing of feedback is important in skill learning. A certain amount is concurrent, yet much feedback may be delayed or withheld until the most appropriate moment.

**Concurrent feedback** is received during the performance of a skill. It occurs simultaneously with skill execution, and it is relayed throughout the body by the proprioceptive mechanism. An example is the feedback that a person receives while balancing in a headstand — information from the brain that enables them to maintain poise. Such a skill requires constant readjustment to the centre of gravity to maintain equilibrium, and its success relies on feedback being continuously supplied to the body.

Often there is a period of time between skill execution and feedback. Feedback received at a later stage is called **delayed** (or terminal) **feedback**. An example of delayed feedback is waiting for the result of a basketball throw. The feedback (a successful or unsuccessful throw) is not received until the ball either enters or misses the basket.

**Knowledge of results and knowledge of performance**

Knowledge of results and knowledge of performance are two varieties of feedback. **Knowledge of results** is information about the outcome of a movement. It suggests how successfully the skill was performed — for example, how many goals were scored from a number of attempts, or what distance was covered in a long jump. It is always external and may come from sources such as a coach or other performer. Generated in response to a performance, knowledge of results is important because it provides information about skill execution. To obtain a different result, the performer may need to execute the skill differently, or perhaps not at all, in a specific situation.

**Knowledge of performance** is information about the pattern of the movement during execution. It is more specific to the way in which the skill is performed. An example is a comment from a coach about the height of the ball toss during a tennis serve, or the angle of the elbow during the pull phase of butterfly swimming. Knowledge of performance gives feedback on the quality of the execution of the skill, and it may generate from either internal or external sources.

Feedback is essential if performance is to be improved. It works best if it is immediate and positive, and if it reinforces correct skill execution. Sometimes coaches are confronted with players who successfully execute a skill even though their technique is incorrect and undesirable in the eyes of the coach. This can lead to frustration when the performer is receiving positive feedback (success) but also negative feedback (the coach’s comment on poor skill execution). Athletes must realise that development of correct technique is essential for long-term success.

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**Application**

*Experiencing feedback*

You will require a number of plastic buckets, tennis balls, blindfolds and recording sheets. Work in pairs.

(a) From a distance of two metres, each person makes 50 attempts at throwing a tennis ball into a bucket. Tell the thrower of their progressive score, and provide coaching to assist their technique. Record the results.

(b) Complete a second attempt of 50 throws, but this time blindfold the performer and do not tell them about the success or otherwise of each throw.

---

**Inquiry**

*How important is feedback?*

1. Identify the types of feedback that were available to the thrower on each occasion in the above application.
2. Discuss why feedback is important in skill learning situations. Why is the timing of feedback critical?
Inquiry
Teaching plan for beginners

Choose a sporting skill with which you are familiar, such as a layup in basketball, serving in tennis or batting in softball. The skill should be discrete and reasonably complex; that is, it should contain some subskills that may need to be taught.

Draw or enlarge a photocopy of the following plan in your workbook. Research the skill and use it to complete the appropriate sections.

| Description of skill | Skill name: ________________
|----------------------|-----------------------------
| Diagram or photograph of skill |

<table>
<thead>
<tr>
<th>Description of area required for teaching</th>
<th>Equipment required</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Characteristics of your learners</th>
<th>How will you motivate your learners?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Drills/activities and practice methods (e.g. layup using whole/part/whole practice method)</th>
<th>Diagrams</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Performance elements (decision making, strategic and tactical development)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>How feedback to learners will be provided</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>How the level of mastery will be assessed</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Evaluation of your lesson</th>
</tr>
</thead>
</table>


Application
Implementing the teaching plan
You now need to teach your skill. Choose two or three other students in your class, students from a year 7 class, or have the teacher organise to visit a local primary school where one class could be divided into a number of groups. Keep a copy of your plan with you to be sure you implement it fully as you work through the activities.

Inquiry
Reflection on my teaching plan and its application
Answer the following questions.
1. Practice methods. Did the practice methods work? Were difficulties encountered with learners? How did you address them? What could you do to improve the methods?
2. Performance elements. How did you integrate performance elements? What kinds of decision had to be made? Were you able to integrate the skill into a game situation? Were you able to use it in a strategy? Did you ask any questions of learners? How did you encourage creativity?
3. Characteristics of learners. What characteristics of learners may have contributed to productive learning? What characteristics did you consider to be negative to the skill learning situation? Were you able to use any characteristics to advantage?
4. Feedback. What types of feedback were used during teaching? Do you think any one type was more productive than any other? How important do you consider feedback to be in learning the skill?

8.4 Assessment of skill and performance
After having taught skills, assessment needs to be made of the effectiveness of methods used in terms of improvement in performance. Each type of performance has a number of ways by which it can be measured. It is important to gather information about skill and performance using accurate and well-established techniques to ensure true reflection of performer achievement.

8.4.1 Characteristics of skilled performers
There is a marked difference between the movements of a skilled performer and those of an unskilled performer. Even to inexperienced judges, the movements of the skilled performer have certain observable qualities: kinaesthetic sense, anticipation, consistency and technique.

Kinaesthetic sense
A skilled performer has well-developed kinaesthesia (or a kinaesthetic sense). Kinaesthesia refers to the system of sensitivity that exists in the muscles and their attachments.

The performer’s kinaesthetic sense allows them to ‘feel’ the movement as they perform it. Inexperienced performers make mistakes because their ‘muscle memory’ is not fully developed, but highly skilled players are especially alert to movement error and are even able to make corrections and modifications while executing the movement. Improved kinaesthesia is a direct result of practice. As our kinaesthetic sense improves, so does
our awareness of the position of our joints and the movement of body parts relative to each other. We become acutely aware of our arms and limbs and precisely where they should be in performing particular movements. Examples in general activity are the ability to brush our teeth without watching, balancing on a bicycle while riding and manoeuvring through markers in an agility run. Unfortunately, brain injury can destroy kinaesthetic function, making precise movements either difficult or impossible.

Well-developed kinaesthetic sense is a trademark of all elite sportspeople. It is particularly evident in sports such as tennis, where players need to return serves in which ball speeds regularly reach 200kph and higher. To enable a successful return of service, the limbs need to respond reflexively and with control, the muscular and neurological systems syncing to enable the racquet to meet the ball in the centre of the strings while also adjusting to either topspin or backspin. This ability is the result of years of repetitive practice where tiny adjustments are made each time a serve is returned until the body know exactly what action to make and how much force to apply. The movement is an autonomic response — a **feel, touch** sensation conditioned by endless practice but giving the appearance of effortless control.
Anticipation

Skilled performers are better able to predict what may happen in specific situations. They can quickly and easily predict the possible flight path of the ball, the speed of the ball, the direction of a pass or the direction in which an opponent may move or pass. This skill allows them added time in which to respond. They can then give more attention to out-maneuvering an opponent.

Anticipation is particularly important in externally paced activities or where fast movement and decision making are necessary, such as in cricket, baseball, tennis and squash. It leads to better timing of responses. A skilful performer can vary the pace of a movement to confuse the opponent and prevent them from anticipating the action. The ability to predict actions can also provide more opportunity to ensure the movement is performed smoothly and with coordination.

Consistency

Skilled performers show much more consistency than unskilled performers. In other words, the skilled performer is able to perform the desired movement repeatedly. This is easy to observe in games such as tennis, where the skilled performer is more consistent in rallies, managing to clear the net and keep the ball in court more regularly. Consistency, like kinaesthetic sense and anticipation, needs to be developed. Along with physical skill improvement, being more consistent in competition involves preparation, planning and commitment to routines. A sense of trust in one’s emotional control and general ability to execute an action or plan is paramount. Research suggests that psychological skills including imagery, concentration, confidence, self-talk and arousal control are important underlying factors in gaining greater consistency in performance.

Consistency is further improved by exposure to situations where it is needed. Often we see good athletes whose performances are beleaguered by inconsistency. Greater exposure to pressure situations can improve this. Generally speaking, exposure to pressure is limited by the time period of a game, infrequency of events and/or the ability to reach levels where constant exposure to pressure will occur. Elite athletes commonly use strategies that work with imagery to simulate pressure situations and build in the desired responses. Exposure to tournament pressure, knowledge of what to do, trust in one’s ability and control of situational anxiety are key measures in improving consistency and are found in skilled performers.

Technique

Technique is a procedure or practical method applied to a particular task. For example, if the task is to serve a tennis ball, good techniques have been established whereby players can learn to carry out the procedure in the most effective manner.

Development of good technique or the desired form of skill execution has a number of advantages.

- The movement is economical and will not use more energy than required.
- The movement is skilful, using only the essential muscles.
- The movement is aesthetically pleasing.
The action has a better chance of being successful because good technique has a sound biomechanical platform.
- The action has a better chance of holding up under pressure.
- The performer has less chance of sustaining injury during execution of the movement.
- Good technique is fundamental to achieving at the higher level.

Good technique is an observable characteristic of skilled performers. It enables elite tennis players to serve at high speeds, apply bounce and topspin, and participate in rallies for extended periods of time. Good technique is fundamental to golfers, enabling them to drive big distances; basketballers to shoot successfully; and cricketers to achieve many runs. In essence, good technique is ‘best practice’, requiring development through drills and game-related activities.

**Inquiry**

**Technique**
1. What is good technique?
2. Why is good technique important?
3. Choose ‘jumping and landing’, ‘throwing and kicking’ or ‘grip and posture’. Explain how good technique is applied in your skill.

**Inquiry**

**Video analysis**
Play a recording or watch a YouTube clip of an elite sports performance — for example, Kobe Bryant’s Last Game (basketball), World Cup soccer or a tennis or golf major. Identify and explain one instance of where you saw examples of each of the following:
- kinaesthetic sense
- anticipation
- consistency
- technique.
Discuss your observations with the class.

**on Resources**

>Weblink: Technique

study on

Characteristics of skilled performers Summary screen and practice questions

**8.4.2 Objective and subjective performance measures**
Measurement is the process of using numeric information to assess a particular physical ability. The information may be presented in the form of times, distances or guidelines. The greater the accuracy of measurements, the more reliable the data will be. Speed measurements using stopwatches or electronic timing, or distance measurements using tape measures, for example, provide reliable information on which to assess a performance because the devices are accurate. Where measurement is not part of the process of gathering information, assessment of the performance tends to be subjective and subsequently less accurate. Subjective
observation refers to a judgement of performance quality based on feelings, impressions or opinions rather than a measurement system. The use of instruments such as measurement tapes and stopwatches makes data more credible by eliminating guesswork; in other words, it increases the degree of objectivity, that is, the extent to which a measure or test is independent of the observer.

A completely objective observation occurs when judges or testers apply the same criteria to measure a performance and do not need to interpret information. Their scores should thus be consistent. In a high jump event, for example, judges use the same measuring scale to determine the height jumped by a competitor. This is a very objective measure because there is virtually no disagreement among the judges.

Objectivity runs on a continuum from highly objective to slightly objective. Some performances, such as a sprint, high jump or javelin throw, are easily measured because a uniform scale of measurement (a stopwatch or tape measure, for example) is used. Appraisal here is highly objective. Other activities, such as judo and fencing, require expert interpretation of special rules. Additionally, team games need to be appraised by competent officials who are familiar with proper adjudication procedures. Appraisal of these types of activity is still objective, but not to the same extent. Two judges rating a diving performance may disagree considerably because there are variables such as the degree of diving difficulty. Thus, there is more room for subjectivity to affect the assessment.
Observations can be made more objective by using:

- **checklists** — lists that include elements such as style, technical correctness, sequencing and execution of the required skill
- **measurement systems** — instruments that accurately discriminate one set of data from another (for example, measuring tapes)
- **established criteria** — a set of procedures, rules or guidelines that indicate how an activity is to be assessed
- **rating scales** — a degree-of-difficulty sheet that awards more marks for movements that are difficult to perform.

The difference between objective and subjective appraisal is illustrated in table 8.3.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Objective assessment</th>
<th>Subjective assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>The throw for goal went through the basket.</td>
<td>The offence scored as a result of poor positional play by the defence.</td>
</tr>
<tr>
<td>Gymnastics</td>
<td>The gymnast scored 7.0 on the floor routine.</td>
<td>The floor routine lacked creativity.</td>
</tr>
<tr>
<td>Swimming</td>
<td>She completed the 50 metre race in 32.7 seconds.</td>
<td>Her slower time was caused by a faulty bilateral breathing technique.</td>
</tr>
</tbody>
</table>

### Validity and reliability of tests

For a test to be considered credible, it needs to meet certain criteria. **Validity** is the honesty of a test — that is, the degree to which it measures what it is supposed to measure. It is the first essential characteristic.

Is the 12-minute run test, for example, a measure of cardiorespiratory endurance or a measurement of something else? We accept that it measures fitness because a major part of the test involves running, which we know develops heart and lung capacity. This fact, together with a review of research, tells us that the relationship between this test and this performance component has been tested many times. However, what about cycle ergometry as a test of our ability to swim 50 metres? We immediately have doubts based on the knowledge that the skills (cycling and swimming) are quite different in (a) the way in which they are performed, (b) the energy systems that they used and (c) the muscle groups involved.

Establishing validity is about determining the strength of a relationship between a performance component (for example, strength) and a test designed to assess that component (the handgrip dynamometer test). Relationships already exist between components and tests that we do not question — for example, a car speedometer as a measure of the speed of the vehicle; a barometer as a measure of air pressure; and a 50 metre sprint as a test of speed. However, the strength of these relationships would have been questioned and tested some time ago, and finally proved beyond reasonable doubt. Continual scrutiny and checking provided credibility to the extent that we no longer question these relationships.

The techniques commonly used to enhance the validity of a test include:

- **judgements about the test items.** We assume for a particular item — for example, the ability to jump — that known good performers score better than known poor performers. If this occurs when the test is administered, then the validity of the test is increased.
- **using already validated but similar tests as an indicator.** If the relationship between the validated test and the new test is close, then it gives strength to the validity of the new test.
- **accuracy in prediction.** The validity of a test is increased if it is a reliable indicator of future performances.
- **ensuring test items contain the component being validated.** A speed test, for example, needs to have running as a component, because simple observation tells us that running is the major part of the test.

Use of a range of these measures strengthens a test’s validity. It would suggest that a single-item test would be satisfactory for assessing the validity of a single skill — for example, the grip dynamometer as a test of...
strength. However, for a game such as hockey, which comprises a large number of movements, it would be more appropriate to use a battery of test items. The validity of a hockey skills test would be increased by the inclusion of a range of skills from the game. A test battery — including the measurement of agility and coordination, together with an assessment of the individual’s ability to hit, dribble and trap — increases the validity of a hockey skills test. It would be called a valid test if the test items measured those skills and abilities represented in the game.

A test also needs to have reliability. This refers to the degree of consistency of a test — that is, the ability of the test and tester to produce the same results on successive occasions. The 50 metre sprint test, for example, is a reliable test of speed if the same tester repeats the same test on the same subject under the same conditions and consistently finds very similar results. Reliability in testing can be improved by the use of similar procedures, conditions and equipment as originally prescribed. If the speed test of the athlete is conducted on successive weeks and the conditions vary considerably (no wind on the first week and a strong headwind on the second, for example), then the degree of reliability decreases considerably.

**FIGURE 8.31** Validity has more to do with accuracy, while reliability has more to do with precision.

1. Good reliability, poor validity
2. Poor reliability, better validity (on average)
3. Good reliability, good validity

### 8.4.3 Personal versus prescribed judging criteria

Criteria refer to the standards or qualities that are used for judging the value of a performance. There are two forms: personal criteria and prescribed criteria. Personal criteria are the preconceived ideas or expectations that an individual brings to judge a performance. Prescribed criteria are established by a sports organisation or body and form the basis of assessment for competitions in that sport or activity.

Personal criteria are frequently used by coaches when they select a team for the following week based on this week’s performance. They may feel that some team members played well and deserve to hold their positions for the next game. Spectators use personal criteria when evaluating dance performances, movies and test matches because their assessments are based on feelings and impressions rather than assigned criteria.

Judgements based on personal criteria rely on feelings and emotions as a measurement tool. A judge’s preconceived attitudes, expectations, opinions and possible bias may contribute to judgements that others may believe to be incorrect or unjustified. In some cases, judges may be unaware of the strength of their personal
conviction towards particular elements of a performance and unwittingly favour certain aspects. For these reasons, total reliance on personal criteria is more suited to appreciation of performances rather than to the impartial judgement of one performance compared with another.

In top level competition in sports such as gymnastics, dance and diving, appraisal is initially quite subjective. In other words, judges watch a skill such as a dive and form an impression based on appreciation of the movement. However, they then apply the prescribed criteria to standardise interpretations as much as possible. This adjusts their subjectivity along a continuum to an area where it is seen to be more objective. The more rigorous the criteria and the more competent the judges in applying the criteria, the more objective is the appraisal.

While it is impossible to make judgements totally objective in performances such as these, the use of prescribed criteria seeks to absorb elements of subjectivity into a more objective framework. A judge’s use of prescribed criteria, such as checklists, rating scales and degree of difficulty charts, helps to more accurately convert the appraisal into meaningful measurements such as a score and something to which an audience, spectators and fellow judges can relate.

For organised competitions, judges are usually supplied with prescribed criteria well before the event. They may discuss interpretations of the criteria, of which some may need clarification. The criteria in the dance evaluation sheet in table 8.4 are prescribed — that is, the skills checklist has predetermined data for assessment and notes the areas on which to focus. During a competition, a judge matches the performance to the criteria to rate the standard of the performance.

### Application

**Using prescribed criteria**

Use the criteria in table 8.4 to appraise a video of a dance performance. As a class, compare your scores and remarks.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inadequate</td>
</tr>
<tr>
<td>Use of the element of composition</td>
<td></td>
</tr>
<tr>
<td>• Space (floor pattern, shape, focus etc.)</td>
<td>1</td>
</tr>
<tr>
<td>• Rhythm elements (beat, accent, tempo, phrasing)</td>
<td></td>
</tr>
<tr>
<td>• Relationships (variation, groups etc.)</td>
<td></td>
</tr>
<tr>
<td>• Flow (uninterrupted)</td>
<td></td>
</tr>
<tr>
<td>• Force (change in the dynamics)</td>
<td></td>
</tr>
<tr>
<td>• Time</td>
<td></td>
</tr>
<tr>
<td>Composition</td>
<td></td>
</tr>
<tr>
<td>• Musicality</td>
<td></td>
</tr>
<tr>
<td>• Structure</td>
<td></td>
</tr>
<tr>
<td>• Choreography</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
</tr>
<tr>
<td>• Technical ability</td>
<td></td>
</tr>
<tr>
<td>• Presentation</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 8.4** A dance evaluation form is an example of prescribed criteria.
Inquiry
Assessing quality of performance
1. How would the criteria be established for making an assessment such as that in the application above? How would you change the criteria?
2. How did your ranking of performance in the above application compare with that of others in the class? Does your ranking indicate a skilled performance? Why?

Inquiry
Objective and subjective performance measures
Choose one type of performance where the method of appraisal is predominantly subjective and another performance that would be best assessed using objective measures. Use an enlarged copy of the following chart to contrast your findings. Justify the appropriateness of techniques selected.

<table>
<thead>
<tr>
<th>Subjective measurement</th>
<th>Objective measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of performance</td>
<td>Type of performance</td>
</tr>
<tr>
<td>How this performance is measured</td>
<td>How this performance is measured</td>
</tr>
</tbody>
</table>

Justification of appropriateness of techniques

8.5 Topic review
8.5.1 Summary
- Learners progress through three recognisable stages of learning skills: the cognitive (beginning) stage, the associative (practice) stage and the autonomous (automatic) stage. Some learners may not reach the autonomous stage in the execution of specific skills.
- The learner brings many characteristics to the learning situation. Personality, heredity, confidence, prior experience and ability particularly influence the direction of the learning experience.
• The learning environment encompasses areas including the nature of the skill, performance element, practice methods and feedback.
• Open skills such as tackling in rugby occur in an environment that is unpredictable and frequently changing.
• Closed skills such as vaulting in gymnastics occur in an environment that is stable and predictable.
• Gross motor skills such as swimming require the use of large muscle groups for execution.
• Fine motor skills such as catching require the use of only small muscle groups to perform the movement.
• Discrete skills such as throwing have a distinctive beginning and end that can be identified.
• Serial skills such as bowling in cricket involve a sequence of smaller movements that are assembled to make a recognisable skill.
• Continuous skills such as swimming have no distinct beginning or end.
• Self-paced skills are movements for which the performer determines the timing and speed of execution.
• Externally paced skills are movements for which an external source controls the timing.
• Performance elements include important game components such as decision making, strategic development and tactical development.
• Strategic understanding refers to the way we play, where we should be at a particular time and what to do, such as returning the ball in tennis using backhand.
• Tactical awareness is about utilising ways of gaining an advantage over an opponent; for example, using a cut-out pass in rugby league or ‘double teaming’ an opponent in basketball.
• Massed practice involves a continuous practice session, with the rest intervals being shorter than the practice intervals.
• Distributed practice (or spaced practice) involves a broken practice session, with the intervals of rest or alternative activities being longer than the practice intervals.
• Feedback constitutes an important role in the learning process because it provides guidance and helps the performer eradicate movement error.
• The many types of feedback include internal, external, concurrent, delayed, knowledge of results and knowledge of performance.
• Assessment of skill and performance includes knowledge of characteristics of skilled performers, objective and subjective performance measures, validity and reliability tests, and personal versus prescribed judging criteria.
• Skilled performers possess observable attributes that make their performances distinctively different from those of poorly skilled performers. These features relate to mainly kinaesthetic sense, anticipation, consistency and technique.
• A large number of tests measure skill. To be credible, the tests need to be both valid and reliable.
• Judging the quality of performance requires the establishment of standards. While personal criteria may be acceptable in some situations (such as where appreciation is the focus), prescribed judging criteria are essential for important competitions.

8.5.2 Questions

Revision
1. What are the main features of each of the stages of skill acquisition? (H9) (3 marks)
2. Why will some learners not progress to the third stage of skill acquisition? (H9) (3 marks)
3. Justify the need for demonstrations for learners who are in the cognitive stage of skill acquisition. (H17) (5 marks)
4. Explain how the specific characteristics of a learner may have an impact on a teaching/learning situation. Use an example in your answer. (H9) (4 marks)
5. Explain how the characteristics of the learner can influence skill acquisition. (H9) (5 marks)
6. Explain the difference between each of the following:
   (a) open and closed skills
   (b) discrete and continuous skills
   (c) a self-paced and an externally paced skill. (H9) (3 marks)
7. Describe a learning situation in which distributed practice would be preferable to massed practice. Account for your choice of this method of practice. (H16) (5 marks)
8. Explain how an understanding of performance elements can improve performance. (H8) (4 marks)
9. Draw a table similar to the one below. Use the text (and further research if needed) to provide two examples of each of the listed skill classifications. (H9) (5 marks)

<table>
<thead>
<tr>
<th>Skill classification</th>
<th>Example 1</th>
<th>Example 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externally paced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internally paced</td>
<td></td>
<td></td>
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<tr>
<td>Discrete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial</td>
<td></td>
<td></td>
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<tr>
<td>Continuous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massed practice</td>
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<td></td>
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<tr>
<td>Distributed practice</td>
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</tbody>
</table>

10. Use examples to explain the difference between massed and distributed practice. (H9) (2 marks)
11. Choose any complex skill and describe how it would be taught using the whole and the part method. (H9) (4 marks)
12. Explain how feedback improves performance. (H8) (3 marks)
13. Explain the difference between concurrent and delayed feedback. (H9) (2 marks)
14. Discuss the importance of knowledge of results and knowledge of performance to learning a tennis serve. (H10) (4 marks)
15. Choose an individual in an elite sport. Explain how the athlete's kinaesthetic sense and mental approach make their performance more skilled than that of a non-elite sportsperson. (H9) (4 marks)
16. Outline the difference between objective and subjective performance measures. (H16) (2 marks)
17. Discuss the difference between validity and reliability in the design of a fitness test. (H16) (4 marks)
18. Discuss the difference between personal and prescribed judging criteria. How may each be used in assessing the quality of performance? (H17) (5 marks)

Extension
Use a recording device or your phone and, with permission, record a class physical education lesson or a sports club training session. Observe how skills are being taught. Report on the various forms of internal and external feedback observed, and comment on the effectiveness of each in improving skills learning. (H16) (8 marks)
8.5.3 Key terms

ability is the ease with which an individual is able to perform a movement or routine. p. 253
acquisition is gaining possession of something. p. 246
acuity is sharpness. p. 253
agility is the ability to move the body from one position and direction to another with speed and precision. p. 253
appraisal is a judgement about the quality of something or somebody. p. 276
associative means connecting or linking ideas. p. 247
autonomous means being in full control of actions so they become automatic. p. 248
closed skills occur in an environment that is stable and predictable.
cognitive refers to mental processing of information, thinking and understanding. p. 246
concurrent feedback is received during the performance of a skill. p. 267
continuous skills have no distinct beginning or end. p. 257
delayed feedback is received after the skill has been executed. p. 267
discrete skills have a distinctive beginning and end that can be identified.
distributed practice (or spaced practice) involves a broken practice session, with the intervals of rest or alternative activities being longer than the practice intervals. p. 263
external feedback is all feedback other than that which occurs as a normal consequence of performing a skill. It includes various forms of external information, such as suggestions from the coach, video replays, judges’ scores and race results. p. 266
externally paced skills are movements for which an external source controls the timing. p. 258
feedback is the information provided to the learner about the nature or result of their performance. p. 265
fine motor skills require the use of only small muscle groups to perform the movement. p. 256
game-centred approach aims to focus on the whole game and all components, rather than a sequence of basic skills assembled within a game format. The emphasis is on integrating thinking and learning rather than skill development in isolation. p. 259
gross motor skills require the use of large muscle groups for execution. p. 256
heredity refers to genetic characteristics inherited from our parents. p. 250
internal feedback occurs as a normal consequence of performing a skill. It embodies feelings, together with sensory information such as seeing the ball and hearing the sound of a ball hitting the bat. p. 265
kinaesthesis (or kinaesthetic sense) refers to the system of sensitivity that exists in the muscles and their attachments. p. 269
knowledge of performance is information about the pattern of the movement during execution. p. 267
knowledge of results is information about the outcome of a movement. p. 267
massed practice involves a continuous practice session, with the rest intervals being shorter than the practice intervals. p. 263
objectivity is the extent to which a measure or test is independent of the observer. p. 273
open skills occur in an environment that is unpredictable and frequently changing.
part practice method is applied when a skill is broken into smaller components and each discrete subskill (subroutine) is practised separately. p. 264
personal criteria are the preconceived ideas or expectations that an individual brings to judge a performance. p. 275

personality refers to an individual’s characteristic way of behaving. p. 249

prescribed criteria are established by a sports organisation or body and form the basis of assessment for competitions in that sport or activity. p. 275

reliability refers to the degree of consistency of a test — that is, the ability of the test and tester to produce the same results on successive occasions. p. 275

scenario is a situation or scene. p. 260

self-confidence is a firm belief in one’s own ability. p. 252

self-paced skills are movements for which the performer determines the timing and speed of execution. p. 258

serial skills involve a sequence of smaller movements that are assembled to make a total skill. p. 257

somatotype is a person’s body type or shape (ectomorphic, mesomorphic or endomorphic).

subjective observation refers to a judgement of performance quality based on feelings, impressions or opinions rather than a measurement system. p. 272

traits are characteristics or observable features of a person. p. 249

validity is the honesty of a test — that is, the degree to which it measures what it is supposed to measure. p. 274

whole practice method is applied when a skill is practised in its entirety. p. 264