INQUIRY QUESTION
How would the organisation of a practice session for a beginner differ from the organisation of a practice session for an elite performer? Discuss what factors a coach needs to consider when deciding upon the most effective type of feedback for their athletes.
Feedback and practice are vital to improve movement skills. Practice strategies need to be tailored to the stage of learning and the type and frequency of feedback based on observation and analysis.

**KEY KNOWLEDGE**
- Practice strategies to improve movement skills including amount, distribution (massed and distributed) and variability (blocked and random)
- Feedback including type (intrinsic, augmented, knowledge of results and knowledge of performance) and frequency

**KEY SKILLS**
- Discuss how skill classification affects the selection of appropriate practice strategies
- Participate in, observe and record the characteristics of different types of practice strategies
- Perform, observe, analyse and report on the role of feedback in improving performance through practical-based activities

**CHAPTER PREVIEW**

- Practice distribution: Massed, Distributed, Blocked, Random
- Variability of practice
- Amount of practice
- Practice
- Skill learning
- Feedback
- Timing: Terminal, Concurrent
- Frequency: Augmented, Intrinsic
- Knowledge of performance
- Knowledge of results
KEY CONCEPT The volume of practice undertaken and the way in which practice sessions are structured and organised has a significant impact on skill learning.

4.1 Practice amount and distribution

Amount of practice

It is generally accepted that the more we practise, the more we learn. The more time an individual practises a new movement skill, the greater chance they have of mastering that skill.

In the best-selling book *Outliers: The Story of Success*, author Malcolm Gladwell investigates factors that have contributed to the success of high-achieving individuals in all walks of life. Loosely based on the research of eminent psychologist Anders Ericsson, Gladwell’s theory contends that success is closely aligned with what he calls the 10 000 Hours Rule; that is, the key to achieving mastery in any field, including elite sport, is to engage in applicable practice for a cumulative period of 10 000 hours.

However, while Malcolm Gladwell has alerted us to the effectiveness of practice time, it’s important to acknowledge that a sports coach or teacher does not have the luxury of limitless time at their disposal. In most sports, there are many skills to be learnt within the time constraints of a training schedule and a competition season. Consequently, a coach cannot afford to spend too much time focused on one skill at the expense of others. Practice time is also influenced by player fatigue, motivation levels, skill complexity, the participant’s age and stage of learning, as well as environmental constraints such as availability of appropriate training facilities.
Maximising practice time

The general recommendation to facilitate effective skill learning within a limited time frame is to allow the learner to spend as much time as possible in meaningful practice. For example, within a 45-minute Physical Education lesson, the teacher should maximise the time the participants spend practising the relevant skills and minimise the time spent on long-winded instruction, setting up equipment or participants waiting in line for their turn. Maximising practice time also ensures greater learner engagement and motivation.
4.1 Practice amount and distribution

Time spent on task
Coaches must make on-balance decisions about how long they spend on one particular skill before they move on to another. A coach can’t afford to take a perfectionist approach to learning individual skills; rather they must be pragmatic about developing a degree of competence across a range of skills in the limited time available. The coach also runs the risk of their learners losing interest if they spend too long on a single skill or activity.

Diminishing returns
Coaches should also be aware of the principle of diminishing returns. The principle of diminishing returns dictates that performers in the early stage of learning will improve rapidly in response to practice. However, as the performer becomes more competent and progresses to the latter stages of learning, their rate of improvement, in response to practice, decreases. Therefore, a coach will need to weigh up whether it’s worth spending a large amount of time trying to make small improvements to their performers’ already refined movement skills or whether they would be better served to use this time for developing new movement skills.

In summary, coaches should consider the following points:

- Generally, the more you practise, the more you learn.
- Maximise meaningful skill practice within the time available.
- In the interest of learner engagement, develop a sense of when it’s best to stop working on one skill and move on to a new activity.
- Be aware of the principle of diminishing returns when deciding how to make the most of training time.

Practice distribution
Practice distribution refers to the ratio of time spent actively practising compared to time spent resting during a practice session.

Massed practice
Massed practice is a form of practice in which there is little or no rest between repeat performances of a skill. As such, massed practice is sometimes referred to as continuous practice. Massed practice sessions can be useful in developing discrete skills; for example, a golfer working on their swing by hitting multiple shots one after the other. Practising these discrete skills in one continuous training block can assist the learner to replicate efficient movement patterns. Discrete skills, unlike continuous skills such as swimming or bike-riding, tend not to be as fatiguing and hence long rest periods are not required. Massed training also helps to maximise the time the learner spends actively practising.

However, more recently there has been a shift away from using repetitive massed practice as a means of developing discrete, closed skills. This is discussed later in the chapter (see ‘Practising discrete/closed movement skills’).

Massed practice also suits the highly motivated and experienced performer. Experienced athletes are more suited to massed practice as they are able to focus their attention on skill practice for longer, and massed practice also affords them
more time to work on complex skills. Massed practice requires participants to work and concentrate for extended time intervals, which can help the experienced athlete develop mental and physical resilience.

Distributed practice sessions

**Distributed practice** sessions are broken up into smaller practice intervals, interspersed with rest periods. In distributed practice sessions, there is either more rest time than work time or at least equal parts work and rest.

**FIGURE 4.5** US champion swimmer, Katie Ledecky. Physically demanding skills are suited to distributed practice.

**FIGURE 4.6** Learning a skill for the first time is best rehearsed in a distributed format.
4.1 Practice amount and distribution

The rest periods in distributed practice enable the learner to digest the coach's instruction and reflect upon what they have learnt. In other words, it allows time for the learning to sink in, sometimes referred to as memory consolidation.

Distributed practice sessions are highly recommended in the following scenarios:
- Learning a new skill
- Learning a complex skill
- The skill is physically and mentally fatiguing
- The performer is young and/or lacks concentration
- The performer lacks motivation

**TABLE 4.1** Massed versus distributed practice

<table>
<thead>
<tr>
<th>Practice distribution</th>
<th>Emphasis</th>
<th>Advantages</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massed practice sessions</td>
<td>Continuous practice; Little or no rest between repeat rehearsal of skill</td>
<td>Maximises practice time; May suit a non-fatiguing discrete skill practice</td>
<td>Physically and mentally fatiguing; Repetitious and boring</td>
</tr>
<tr>
<td>Distributed practice sessions</td>
<td>More or equal time spent resting between practising skills; Practice in shorter intervals interspersed with recovery periods</td>
<td>Greater learner engagement; Assists beginner or less motivated performer; Reduces fatigue during practice; May help to learn a complex skill; Recovery period allows for memory consolidation</td>
<td>More time consuming; May be less suited to discrete skill rehearsal</td>
</tr>
</tbody>
</table>

**FIGURE 4.7** Complex skills are best suited to distributed practice.

**TABLE 4.1** Massed versus distributed practice

**Practising discrete/closed movement skills**

Highly repetitious practice has traditionally been considered the most effective way to rehearse discrete/closed skills; for example, a golfer hitting shot after shot on the practice range in order to replicate effective technique. This type of practice is...
CHAPTER 4 • Practice and feedback

considered to be massed and blocked (see below) where the golfer will generally hit the same shot, with the same club and at the same target for an extended period of time. A similar example is a basketballer who repetitively practises his shooting from the free-throw line. Research has established that this type of rehearsal is very effective at enhancing performance during a practice session. However, this highly repetitive blocked practice does not always bring about substantial improvements in competition performance.

**Figure 4.8** Each skill should have elements of planning, performance execution and outcome evaluation.

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It is important that practice is more than merely replicating the physical mechanics of the movement skill. Effective practice requires the learner to engage in the cognitive processes of skill planning and organisation, error detection and implementing correctional strategies. A coach should ensure that the cognitive demands in practice reflect the cognitive demands of competition. Practice that combines both the mechanical and cognitive demands of skill performance facilitates more effective skill learning and ensures the learner is better prepared for competition (see figure 4.9).

“Skill acquisition researchers suggest that it’s not how much the performer practises (i.e. the absolute number of physical repetitions of the biomechanical pattern, such as a golf swing), but how the performer completes each repetition (i.e. active involvement of the brain during planning and interpretation of subsequent motor behaviour) as the practice factor that contributes most to the motor learning process.”

Jae T. Patterson and Timothy D. Lee, *Developing Sport Expertise, 2nd Edition.*

**Figure 4.9** Mindless repetitive practice does not always improve performance in competition.
In the example of the golfer working on their shots at the driving range, the following considerations should apply to the practice session:

- Before each practice shot, the learner should stand behind the ball, understand the goal of the skill (i.e. distance, intended target and ball flight) and plan the appropriate movement (i.e. swing speed, swing plane, posture and appropriate club selection).
- The learner observes the ball flight, assesses the relative performance success, evaluates potential flaws in skill execution and applies correctional strategies.
- The learner should frequently change the club used.
- The learner should regularly change the target.

Researcher Stephen Scott believes a movement skill can be broken down into three components: brains, biomechanics and behaviour, otherwise referred to as the “Bs” of skill movement. These are set out as follows:

**Brain**

The brain assesses the goal and specific demands of the movement skill and designs an applicable movement plan for the musculoskeletal system to execute.

**Behaviour**

The observable behaviour of the learner. That is, did they successfully achieve their intended goal? This informs future planning and skill execution.

**Biomechanics**

The actual skill performance.
Coaches and athletes should ensure that all three components (brain, biomechanics and behaviour) are instilled in practice to facilitate effective movement skill learning. Coaches need to be aware that this technique may result in a greater number of skill errors during practice, however, in the long run, it will lead to better transfer of learning and superior performance in competition.

**TEST Your Understanding**

1. Explain the difference between massed practice and distributed practice. Using a coaching example, explain when it is appropriate to use massed practice and when it is appropriate to use distributed practice.

2. Outline three factors a team coach much consider in order to maximise skill learning and ensure that all relevant skills are developed equally.

3. In relation to skill learning, explain the concept of 'diminishing returns'.

**APPLY your understanding**

4. Choose a sport that requires competitors to perform a closed/discrete skill.
   a. Describe the relevant skill.
   b. With reference to the three B's model, explain how you would structure a practice session to improve this skill.

5. The head coach of the Hockeyroos wants to improve the players’ dribbling skills: to enhance their ability to dribble around opposition defence, avoid ‘turnovers’ and maintain their skills throughout a long and physically demanding game.
   With reference to practice distribution, discuss the ideal organisation of a training session in order to achieve the coach’s goals.

6. **Practical activity: massed versus distributed practice**
   The aim of this learning activity is to investigate the effect of practice distribution.

   - **Equipment:** Hoops
   - **Method:** Work in pairs. Each partner will attempt to master the hula hoop. If a student is already proficient in hula hoop, set them a more challenging task: e.g. use two or three hoops.
   - **Trial conditions:** In each trial, the student is pre- and post-tested; that is, they are timed how long they can spin the hula hoop before it falls.
     - **Trial 1:** The first student in your pair attempts to master the hula hoop action in one continuous practice session lasting for 15 minutes. The partner who watches on can provide correctional feedback.
     - **Trial 2:** The second partner then attempts to master the hula hoop action. In this trial, the student rehearses the movement for three minutes and rests for two minutes (the student does this three times in the course of 15 minutes). The observing partner can provide feedback.
   - **Results:** Record and analyse the results from each of the trials. Average the results for the entire class.
   - **Discussion**
     a. Classify the type of practice distribution in each trial.
     b. Which type of practice distribution was more effective at facilitating skill learning?
     c. Outline potential reasons for discrepancies in skill learning between the two types of practice distributions.
4.2 Practice variability

**KEY CONCEPT** A coach should apply appropriate levels of practice variability depending on the participant’s stage of learning and the specific demands of the movement skill.

We know that when a learner repetitively practises the same skill, in the same way and in the same predictable environmental conditions, they will develop a consistent and successful movement pattern in a relatively short period of time. However, what happens when the same learner has to apply this skill to a more open, game environment; an environment where the newly developed skill must be adapted to meet the specific demands of game constraints as well as being spliced together with other skills? More than likely the learner's skill execution will be seriously compromised. To prevent this detriment to game performance and to maximise skill learning, coaches must give careful consideration to providing suitable practice variability.

Variability refers to the amount of change and uncertainty in an environment or in the performance of a skill.

**FIGURE 4.12** Short-sided games force the participants to develop applicable and versatile skill sets.

Practice variability refers to the degree to which a coach varies the conditions in which skills are rehearsed, as well as the number and variety of skills that are practised in a particular training session. The design of effective practice variability is largely dependent on the type of skill and the performer's stage of learning.

Practice variability helps develop versatile movement skills that are applicable to game situations. It allows the learner to explore what works and what doesn't work; for example, hockey players taking part in a short-sided game of keepings-off are forced to develop passing skills that are applicable to a game of hockey. In other words, the players develop passing skills that enable them to distribute the ball quickly and accurately, skills they may not learn in uncontested partner work.
Furthermore, a varied practice session is generally more interesting for the learner, ensuring high levels of motivation and engagement.

Three types of practice that describe the extent of practice variability are, in order of least varied to most varied: blocked, serial and random.

**Blocked practice**

**Blocked practice** sessions involve practising the same skill repetitively in the same practice conditions for a set period of time; for example, a volleyball coach works on their player’s serve for a 15-minute time period before working on the player’s dig for 15 minutes. Blocked practice sessions have relatively low levels of practice variability.

**FIGURE 4.13** Blocked practice.
Partner work allows players to practise a specific skill in isolation in a predictable learning environment.

**FIGURE 4.14** <Caption to come>  
**FIGURE 4.15** <Caption to come>
Blocked practice is effective in the early stages of learning, particularly with complex movement skills. It enables the learner to become familiar with the basic mechanics of the skill, replicating and refining skill execution before having to contend with other skills, as well as less predictable environmental factors. Blocked practice generally results in significant improvements in skill performance during practice sessions, however these improvements do not necessarily transfer to competition performance.

As performers become more familiar with the new skill, the need for variability in practice becomes more apparent.

**Serial practice**

Serial practice sits halfway between blocked and random practice in regard to variability. In serial practice, different skills are rehearsed but in a fixed and predictable sequence; for example, a tennis coach makes his young learner hit four to six forehands, then four to six backhands, followed by four to six volleys, before starting on the forehand again and repeating the sequence over and over.

The advantage of serial practice is that it provides the benefits of both blocked and random practice. In other words, it has sufficient repetition to allow for the refinement of basic skill mechanics but also provides enough practice variability to prepare the learner for competition. Serial practice is ideal for the intermediate learner but can also be used effectively on elite-level performers.

**Random practice**

In random practice, a variety of skills is rehearsed within the same session. Unlike block practice, no one skill is worked on for a defined period of time or in a repetitive manner. Rather, skills are practiced in combination and rehearsed in random order; for example, a golfer working on their putting stroke practices different length putts in random order. Random practice, once the learner can consistently perform the basic mechanics of the relevant skills, is a means by which a high degree of variability can be added to practice. The learner is not afforded the time to replicate the mechanics of a particular movement skill but rather they are forced to meet the cognitive challenges of executing multiple skills within a relatively short period of time.
Random practice has a significant impact both on learning (skill acquisition) and performing in a game environment. By constantly changing the skill that is being performed, the learner is forced to recreate the mental action plan (the basic blueprint for the successful movement) for each skill. This constant redesigning and implementing of the action plan works to improve the memory of the relevant skills. Random practice also encourages the learner to be proactive about solving movement skill challenges that are comparable to the challenges they will face in competition. In other words, random practice encourages participants to be active learners rather than rote learners.

During highly variable practice sessions, it is not uncommon for there to be a relatively high number of performance errors. However, in the long-term, variable practice ultimately leads to greater transfer of learning (the retention of skills learnt in practice) and more substantial improvements in competition performance.

**TABLE 4.2** Blocked, serial and random practice

<table>
<thead>
<tr>
<th>Degree of practice variability</th>
<th>Blocked practice</th>
<th>Serial practice</th>
<th>Random practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitability for stage of learning</td>
<td>Cognitive</td>
<td>Associative</td>
<td>Autonomous</td>
</tr>
<tr>
<td>Emphasis</td>
<td>Very little or no practice variability</td>
<td>A number of skills are practised in the same practice session</td>
<td>A number of skills are practised in the same practice session</td>
</tr>
<tr>
<td></td>
<td>The learner’s attention is predominantly on executing and replicating ideal skill technique</td>
<td>Different skills are practised in a predictable sequence</td>
<td>Skills are practised in random order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The learner’s attention is divided equally between executing skill technique and decision making</td>
<td>Specific to the relevant game environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The learner’s attention is predominantly given to decision making</td>
</tr>
<tr>
<td>Advantages</td>
<td>The novice learner is able to concentrate on one skill at a time, free from distractions</td>
<td>Enables a moderate degree of practice variability for the intermediate or associative learner</td>
<td>Most effective at preparing the learner for the games environment:</td>
</tr>
<tr>
<td></td>
<td>The learner replicates the basic mechanics of skill technique</td>
<td>Is an important progression towards skill mastery and game preparedness</td>
<td>– more closely resembles the physical and cognitive demands of a game</td>
</tr>
<tr>
<td></td>
<td>Facilitates significant improvement in skill execution during practice sessions, giving the learner confidence</td>
<td>Helps the learner to develop confidence in their skill performance</td>
<td>– enables the learner to develop more applicable skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– enables the learner to improve applicable decision-making skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Greater transfer of learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Encourages participants to be active learners</td>
</tr>
</tbody>
</table>
Consideration for varying practice for skill learning

There are a number of factors a coach must consider when designing the appropriate level of variability for practice.

- Practice variability can be added to training sessions by changing the practice conditions. For example, a netballer can choose to rehearse their goal shooting by themselves or under the pressure of an opposing goal-keeper. This type of practice, where the same skill is practised in a different manner, is referred to as intraskill.

  Practice variability can also be added by changing the skills being rehearsed. This is referred to as interskill and is most applicable to random or serial practice sessions.

As a general rule, there should be less variability of practice in the early stages of learning and more variability of practice in the latter stages of learning. In early stages of learning, the more predictable/closed environment helps to establish the basic skill performance. However, as the learner becomes more competent in skill execution, the more they will benefit from practice variability.

- There should be a higher degree of practice variability for open sports than closed sports. However, intraskill variability is important to enhance closed skill performance.

- The physical and cognitive demands of variable practice should mirror the physical and cognitive demands of the relevant games environment. Variable practice ensures the skills learnt in training can be successfully applied in competition.

- Constraint-based instruction, the process of varying game constraints (chapter 3) to direct learning, relates closely to varying practice. Constraint-based instruction is a form of variable practice designed to achieve a designated learning outcome.

- Lower variability in practice will lead to better performance in practice, however greater variability of practice will result in greater learning and better preparedness for the game environment.

- There are circumstances where it is preferable to produce immediate success, albeit in a low variability environment. For example, in a pre-game warm-up, basketballers practise their lay-ups in uncontested line drills so as to develop confidence and feel before they are exposed to the highly variable demands of the game itself.
Deliberate play, practice and programming

A considerable amount of research has gone into establishing the ideal amount and type of practice required to achieve skill mastery. It was Anders Ericsson (Ericsson et al., 1993), who attributed increases in skill performance almost solely to the number of hours spent in what he categorises as deliberate practice. In Eriksson’s words, deliberate practice amounts to performing a “well defined task with the appropriate difficulty level for the particular individual, (with) informative feedback, and opportunities for repetition and corrections of error”. Interestingly, Ericsson contends this type of practice does not necessarily need to be enjoyable.

Deliberate practice is a highly structured form of practice aimed at enhancing specific skill performance, which usually involves instruction from an expert coach. Most participants involved in high level or elite sport would be familiar with this type of practice and would acknowledge its role in movement skill development.

However, it is not always the case that ‘more is better’ in regard to deliberate practice and resultant skill development. Some coaches and parents subscribe to the idea of early specialisation regarding sport participation in an effort to gain a performance advantage; that is,
Early specialisation is the participation in a single sport from a very young age, involving a high level of structured practice and a low level of deliberate play in an attempt to fast-track skill development and gain a competitive advantage. This early specialisation suits sports such as gymnastics where body size, in particular power-to-weight ratio, has a significant impact on skill performance.

However, while early specialisation may lead to early gains in skill performance, it may also put the young athlete at risk of burn-out. For an athlete suffering from burn-out, sport is no longer enjoyable and they lack the intrinsic motivation to apply themselves to practice. Early specialisation and the accompanying heavy and repetitive training load may also put the young participants at risk of overuse injuries.

Another researcher, Jean Cote, devised the developmental model of sports participation as a framework to better understand potential pathways to sport expertise (elite sport). Cote’s developmental model identifies three distinct development phases in which the learner is exposed to different types of practice on their pathway to sport expertise.

The three phases are:
- the sampling years (childhood; 5–12 years)
- the specialising years (early adolescence; 13–15 years)
- the investment years (late adolescence: 16+ years).

In the sampling years, the learner participates in practice Cote refers to as deliberate play. Deliberate play, as mentioned in chapter 3, generally takes the shape of an enjoyable backyard or neighbourhood game, where the participants can experiment with different skill techniques without the pressure and
expectation associated with more structured and coach-centred practice. Deliberate play cultivates an independent and intrinsically motivated learner empowered to discover and develop effective movement skills and game tactics.

In the specialising years, the skill learner participates in one or two competitive sports and refines skill development through an even mix of structured play and structured practice. In the investment years, the athlete focuses on a single sport and practice is almost entirely structured practice.

Cote recognised the chances of a learner reaching elite level sport can be enhanced through participating in a range of sports and activities at a young age. This diverse range of experience enables the young athlete to develop fundamental physical and cognitive skills that can be applied across a number of different sports (see table 4.3). These cognitive and physical attributes enable the learner, after a period of investment in heavy deliberate practice, to attain elite level performance.

### TABLE 4.3 Classification of elements that may be transferable across sports

<table>
<thead>
<tr>
<th>Elements</th>
<th>Transferable aspects</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement</td>
<td>Biomechanical and anatomical actions required to perform a task</td>
<td>Throwing a baseball overhand and an overhand serve in tennis.</td>
</tr>
<tr>
<td>Perceptual</td>
<td>Environmental information that individuals interpret to make performance-related decisions</td>
<td>Field hockey and soccer both require participants to accurately interpret the actions of their opponents in order to be successful.</td>
</tr>
<tr>
<td>Conceptual</td>
<td>Strategies, guidelines and rules regarding performance</td>
<td>Gymnastics and diving share conceptual elements (e.g. similar roles).</td>
</tr>
<tr>
<td>Physical conditioning</td>
<td>Physiological adaptations across similar modes of training</td>
<td>Short-term interventions of combined run–cycle training are as effective as running alone in increasing aerobic capacity.</td>
</tr>
</tbody>
</table>


Cote’s development model for sports participation actually tracks three different pathways:
1. recreational participation
2. elite performance through sampling (diverse experience in early learning)
3. elite performance through early specialisation (little or no sampling in early learning).
4.2 Practice variability

The model not only describes these three pathways and their respective learning experiences but also looks at outcomes in terms of health and enjoyment (see figure 4.24). Clearly, early specialisation is a legitimate pathway to elite sport, however it comes at a cost to the participant's health and wellbeing.

Understanding Ericsson's deliberate practice and Cote's development model including the concept of deliberate play, helps coaches to plan and facilitate learning experiences that ensure effective movement skill development. Coaches learn that goal-orientated, coach-driven deliberate practice is necessary to advance the learner on their pathway to skill mastery. But coaches also learn that it is necessary to give the young learner time and space to experiment with different techniques and, most importantly, contrary to Ericsson's deliberate practice, have fun.

The Australian Institute of Sport has borrowed ideas from the likes of Ericsson and Cote and, in an effort to hasten sports expertise, has engaged in a process of deliberate programming. Rather than looking solely at the impact of types of practice on skill development, deliberate programming takes a more holistic view of the pathway to sport expertise. Deliberate programming looks to fast-track the pathway to elite sport through the strategic coordination of sports science, sports medicine and expert coaching. This deliberate programming approach to hot-housing elite talent was inspired by the Australian Winter Olympics skeleton program. In 2005–6 the Australian Winter Olympic team used talent identification to select female athletes from a range of sports and then attempted to make these complete novices into Olympic-standard skeleton racers within a 14-month period.

**FIGURE 4.24 Developmental model of sports participation**


Understanding Ericsson's deliberate practice and Cote's development model including the concept of deliberate play, helps coaches to plan and facilitate learning experiences that ensure effective movement skill development. Coaches learn that goal-orientated, coach-driven deliberate practice is necessary to advance the learner on their pathway to skill mastery. But coaches also learn that it is necessary to give the young learner time and space to experiment with different techniques and, most importantly, contrary to Ericsson's deliberate practice, have fun.

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### FTEM stage

<table>
<thead>
<tr>
<th>FTEM stage</th>
<th>F1</th>
<th>Foundation</th>
<th>Learning and acquisition of basic movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active lifestyle</td>
<td>F2</td>
<td>Foundation</td>
<td>Extension and refinement of movement</td>
</tr>
<tr>
<td>Sport</td>
<td>F3</td>
<td>Foundation</td>
<td>Sport specific commitment and/or competition</td>
</tr>
<tr>
<td>Sport excellence</td>
<td>T1</td>
<td>Talent</td>
<td>Demonstration of potential</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>Talent</td>
<td>Verification</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>Talent</td>
<td>Practicing and achieving</td>
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<tr>
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<td>T4</td>
<td>Talent</td>
<td>Breakthrough and reward</td>
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<td></td>
<td>E1</td>
<td>Elite</td>
<td>Representation</td>
</tr>
<tr>
<td></td>
<td>E2</td>
<td>Elite</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>M-1</td>
<td>Mastery</td>
<td>Sustained success</td>
</tr>
</tbody>
</table>

The story of the Australian women’s skeleton team and their efforts to make the Calgary Winter Olympics in 2006 has been made into a documentary: *Nerves of Steel*. To watch the documentary, an excellent example of trying to ‘hot-house’ skill performance through deliberate programming, use the *Nerves of Steel* documentary weblink in your eBookPLUS.

**FIGURE 4.25** The FTEM model recognises the importance of a diverse range of sporting experience as the first step on the pathway to elite sport. To read more, click on the FTEM model weblink in your eBookPLUS.

**FIGURE 4.26** Skeleton, Winter Olympics
The deliberate programming approach relates closely to the AIS’ FTEM (Foundation, Talent, Elite and Mastery) model, which in turn borrows heavily from Cote’s development model. As outlined in Developing Sport Expertise, Farrow et al., Chapter 4, “…the strategic and combined layering of sports science and sports medicine, excellent coaching, early and aggressive competition immersion, close program and individual case-management, challenging and enjoyable daily training environments, upward pressure through competitive cohort immersion, and novel qualification and selection strategies collectively typify the multi-dimensional aspects of performance progression central to the FTEM philosophy.”

### TABLE 4.4 Summary table of practice considerations applicable to different stages of learning

<table>
<thead>
<tr>
<th>Type of learner</th>
<th>Practice distribution</th>
<th>Practice variability</th>
<th>Type of practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Distributed</td>
<td>Blocked</td>
<td>Deliberate play</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Distributed massed</td>
<td>Serial</td>
<td>Deliberate play/ deliberate practice</td>
</tr>
<tr>
<td>Elite</td>
<td>Distributed massed</td>
<td>Random</td>
<td>Deliberate practice</td>
</tr>
</tbody>
</table>

### TEST your understanding

1. Outline each of the following:
   - (a) practice variability
   - (b) deliberate play
   - (c) deliberate practice
   - (d) early specialisation.

2. Explain the difference between blocked, serial and random practice.

3. Outline three ways in which highly variable practice can benefit the learner.

### APPLY your understanding

4. (a) Make a copy of the table below in your notes. Tick the column to indicate the type of practice distribution and amount of practice variability appropriate to both the stage of learning and the particular movement skill.
   - In each case, explain your choice of appropriate practice design in relation to distribution and variability.

#### Skill learning

<table>
<thead>
<tr>
<th>The learner and the movement skill</th>
<th>Practice distribution</th>
<th>Practice variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner and the movement skill</td>
<td>Massed</td>
<td>Distributed</td>
</tr>
<tr>
<td>An elite tennis player practising their ground strokes, volleys and overheads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A novice soccer player practising passing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An intermediate golfer practising various iron shots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A novice swimmer practising butterfly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A highly motivated elite netballer player practising game play</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. **Practical activity: variability of practice**

   The aim of this learning activity is to investigate the effect of variability of practice on performance.
   - **Equipment:** Tennis balls and targets
   - **Method:** Use your non-preferred hand to bounce the ball on the floor before hitting a target on the wall. Score one point for each target hit.
   - **Test conditions**
     - **Test 1:** For half the class (group 1), run 15 practice trials standing three metres from the target.
     - **Test 2:** For the other half (group 2), run five practice trials standing three metres from the target, five trials standing four metres from the target and five trials standing five metres from the target.
     - **Test 3:** Both groups run 10 trials standing six metres from the target.
   - **Results:** Record and analyse the results from each of the trials.
Discussion
(a) Which group would you have expected to score more points in tests 1 and 2? Why?
(b) Which group scored the most points in their trials standing six metres from the target?
(c) How does variability of practice improve performance?

EXAM practice
(ACHPER practice exam 2016, question 12)
6 Select the response below that best describes random practice.
(a) Repetitive practice of the same task in one training session
(b) Performing the same task sequentially in one training session
(c) Performing varied sequencing of different skills in one training session
(d) Repetitive practice of different tasks over a number of training sessions

(ACHPER practice exam 2016, Section B, question 7)
7 The local hockey coach has just taken on the task of coaching a junior side with a wide range of skills and experience. She has split the team into three groups based on the stage of learning they are at with trapping and passing.

5 marks
(a) Outline one distinct characteristic you would expect to see from each of the groups listed above.

(b) Discuss the type of environment and method of practice that would best suit the least advanced group.

3 marks

2 marks
4.3 Feedback

**KEY CONCEPT** Feedback is the essence of skill learning, enabling the learner to correct and refine skill performance.

**Feedback** is any form of information the learner receives about their skill performance. Feedback can come from a variety of sources and provide information about skill errors or information that reinforces successful movement patterns. Coaches must think carefully about the types of feedback they provide and how to best tailor feedback to the specific needs of the learner.

Whatever the coach decides, it's important to recognise that feedback is a critical and indispensable part of skill acquisition.

Feedback works on a number of different levels:
- Feedback motivates the learner by providing information on the progress of skill learning.
- Feedback highlights skill errors and enables the learner to make appropriate corrections.
- Feedback also provides positive reinforcement, confirming when the learner is performing correctly.

**Types of feedback**
There are many forms of feedback, each of them critical to the ongoing development of the learner.

**Intrinsic feedback** is the information the performer receives directly from their sensory systems. Intrinsic information is provided by the learner's visual and proprioception systems as well as cutaneous systems (the skin: pain, temperature and pressure). For example, the basketballer shooting at the free-throw line is aware of the coordination of their body parts to execute the shot (proprioception), feels (cutaneous) the spin they impart on the ball at the point of release and sees (visual) the flight path relative to the basket.
to the ring. Intrinsic feedback often allows the athlete to correct or improve their skill execution during the performance.

Coaches may use questioning as a strategy to enhance the performer’s use of intrinsic feedback; for example, the cricket coach asks ‘do you feel balanced or unbalanced when you successfully hit an off-drive in cricket?’

Augmented feedback

Augmented feedback refers to information that comes from sources external to the performer. Traditionally, augmented feedback describes the information that comes from an instructor or a coach; for example, a basketball coach telling a player that their free-throw shots are falling short because of a lack of knee bend. This could also be reinforced by another form of augmented feedback such as video analysis. The player and coach are able to review game video, recognise faults in the shooting technique and subsequently make the appropriate corrections.

In endurance sports involving continuous skills, such as cycling and running, augmented performance feedback can come in the form of monitors that record heart rate, cadence, speed and wattage. While this feedback does not relate directly to skill execution, it does provide information on the relative success or failure of that skill performance. Hence we can say feedback can be divided into two broad categories: knowledge of performance (e.g. the basketballer’s shooting technique) and knowledge of results (e.g. did the basketball go in the hoop or not?).

Knowledge of performance

Knowledge of performance refers to feedback that provides information about the process of performing the skill; for example, a golfer is able to recognise they have a problem with their weight transferral after watching a video of their swing. It provides feedback on how the skill is performed, rather than the outcome or result of that skill performance. Knowledge of performance can be an augmented form of feedback, as is the case of video analysis or, more commonly, verbal feedback from the coach. Knowledge of performance can also be an intrinsic form of feedback, such as the performer’s sense of feel or proprioception; for example, the golfer can feel when their weight is too far back in their stance, or if the club face is not square through the ball strike.

FIGURE 4.28 Augmented feedback from a coach
Coaches, for the most part, should concentrate on providing knowledge of performance feedback as this is the most effective means of correcting faults and facilitating learning.

Knowledge of performance can be further broken down into either descriptive feedback or prescriptive feedback. Descriptive feedback gives an account of the learner's skill performance and provides details of what they performed correctly and what they performed incorrectly. Prescriptive feedback points out the skill error and prescribes a strategy to correct it. Prescriptive feedback is suited to a beginner who has no skill correction strategies yet, whereas descriptive feedback is more suited to an experienced performer.

**Knowledge of results** is information about the outcome of your skill performance. Using the previous example, the golfer receives knowledge of results regarding the golf shot by seeing the resulting ball flight and where the ball lands. Generally speaking, knowledge of results is clearly evident to the learner. The learner can see when the basketball goes into the hoop or when the softball is struck into the foul zone. As such, the coach doesn’t need to spend as much time providing knowledge of results feedback.

Knowledge of results can be important in the early stages of learning, particularly as successful outcomes can be a strong motivating factor for the beginner performer. Also, a beginner may need to be educated as to what constitutes a successful result. An inexperienced player will recognise scoring a goal in soccer as an obvious example of a successful skill performance; however, they may not recognise less obvious, yet nonetheless important, skill performance outcomes. For example, a soccer player who dribbles the ball to draw a defender to create space for their teammates to receive a pass is also achieving a successful performance. However, this type of result may need to be explained to a novice participant.
Other forms of augmented feedback classifications include:

**Correct versus incorrect feedback**
Incorrect feedback focuses on the learner's skill errors, while correct feedback focuses on what the learner is doing well. Correct feedback is important as a learner will be motivated to practise more if they are experiencing relative success. Incorrect feedback is crucial for effective skill learning; correcting skill errors in an effort to develop effective technique.

**Precision of feedback: qualitative versus quantitative**
Qualitative feedback provides general feedback about movement skill performance; for example, a sprint coach tells their athlete 'your hips are too high and your back leg is too straight in the set position during the sprint start and this is resulting in a lack of push off the rear block'.

![Knowledge of results](image1)

**FIGURE 4.30** Knowledge of results

![Quantitative feedback](image2)

**FIGURE 4.31** Quantitative feedback is precise and uses numerical values.
Quantitative feedback is more precise feedback, which uses numeric values; for example, the sprint coach informs the athlete the angle at the knee in their rear leg is 140 degrees. An experienced athlete can interpret and utilise this precise form of feedback, however a novice athlete will prefer more general qualitative feedback.

<table>
<thead>
<tr>
<th><strong>KP v. KR</strong></th>
<th><strong>Use</strong></th>
<th><strong>When</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>KP</td>
<td>use</td>
<td>when learning most movement skills</td>
</tr>
<tr>
<td>KR</td>
<td>use</td>
<td>when the learner cannot work out the outcome for themselves</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Descriptive v. Prescriptive</strong></th>
<th><strong>Use</strong></th>
<th><strong>When</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive</td>
<td>use</td>
<td>when instructing high-level performers</td>
</tr>
<tr>
<td>Prescriptive</td>
<td>use</td>
<td>when instructing beginners</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Congruent v. Incongruent</strong></th>
<th><strong>Use</strong></th>
<th><strong>When</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent</td>
<td>use</td>
<td>most often</td>
</tr>
<tr>
<td>Incongruent</td>
<td>use</td>
<td>less often</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Correct v. Incorrect</strong></th>
<th><strong>Use</strong></th>
<th><strong>When</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct</td>
<td>use</td>
<td>to help motivate</td>
</tr>
<tr>
<td>Incorrect</td>
<td>use</td>
<td>to support learning of motor skills</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Precision</strong></th>
<th><strong>Use</strong></th>
<th><strong>When</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
<td>use</td>
<td>for high-level learners</td>
</tr>
<tr>
<td>Qualitative</td>
<td>use</td>
<td>for beginners and young learners</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>General v. Specific</strong></th>
<th><strong>Use</strong></th>
<th><strong>When</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>use</td>
<td>to encourage learners</td>
</tr>
<tr>
<td>Specific</td>
<td>use</td>
<td>to reinforce specific behaviour or action</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Inaccurate</strong></th>
<th><strong>Use</strong></th>
<th><strong>When</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inaccurate</td>
<td>Do not use, if unsure, provide general feedback or use questioning.</td>
<td></td>
</tr>
</tbody>
</table>

**FIGURE 4.32** A summary of different forms of feedback and their appropriate application
TEST your understanding
1. (a) Explain what is meant by augmented feedback.
   (b) Outline four examples of augmented feedback in relation to sports coaching.
2. (a) Explain what is meant by intrinsic feedback.
   (b) Outline four examples of intrinsic feedback in sports performance.
3. Research the following sensory systems:
   (a) proprioception
   (b) cutaneous.
   With the use of a sporting example, explain the type of feedback these systems provide and the significance of this feedback in terms of successful skill performance.
4. Explain why knowledge of performance feedback is generally more effective than knowledge of results with respect to facilitating skill learning.

APPLY your understanding
5. Practical activity: feedback
   The aim of this learning activity is to investigate the effect that the amount and type of feedback has on skill performance.
   Equipment: Volleyball and hoop
   Method: Working in pairs, stand three metres from your partner, holding the ball and keeping your back to them. Try to throw the ball over your head (without looking) and through a hoop held by your partner. You have 10 chances.
   Write down the number of successful scores for each of the following scenarios (use the point system to work out the total scores):
   (a) Ball goes through hoop (3 points)
   (b) Ball makes contact with the hoop (2 points)
   (c) Complete miss (1 point).
   Test conditions
   Test 1: Receive no feedback
   Test 2: Receive limited feedback: “yes the ball went through the hoop” or “no, you missed”
   Test 3: Receive as much feedback as possible about the ball flight in relation to the hoop and about the relative success of the performance. Your partner can also make suggestions about how to improve your performance.
   Results: Record and analyse the results for each of the trials for your entire class; that is, what was the average result for tests 1, 2 and 3?
   Discussion
   (a) Define the types of feedback received in tests 2 and 3.
   (b) What do the results of test 1 tell us about the importance of feedback in regard to skill learning?
   (c) Which test accrued the highest average score? Explain why.
   (d) What other types of feedback could your partner provide to further enhance your performance?

EXAM practice
6. Select the best example of internal feedback.
   (a) An athlete using knowledge of results to change their performance
   (b) An athlete using knowledge of performance to change their performance
   (c) A coach giving feedback on an athlete’s technique to help improve their performance
   (d) An athlete using their own senses including visual, auditory and proprioception to adjust their technique

7. (Adapted from ACHPER practice exam 2016, Section B, question 8)
   The table below has the results of a Year 11 Physical Education class who were investigating the effect of feedback on performance. The results were achieved by performing the same skill, with each group practising using different styles of feedback. Students were given twenty shots at throwing a basketball over their head into a net. They received two points for a basket, one point if they hit the edge and no points if they missed. The average score for each group is listed below.

<table>
<thead>
<tr>
<th>Feedback condition</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average score</td>
<td>8 pts</td>
<td>12 pts</td>
<td>16 pts</td>
</tr>
</tbody>
</table>

   (a) Consider the average scores above for conditions 1, 2 and 3. Match each of the conditions above to the correct description below.
   i. Extensive feedback on their performance and detailed feedback on results
   Condition _________________________
   ii. No feedback at all
   Condition _________________________
   iii. Feedback on results only (e.g. “in basket” or “missed basket”)
   Condition _________________________
   (b) Explain your choices in part a (i.e. why did you associate a particular point score with a particular type of feedback?)
   3 marks
**4.4 Frequency and timing of feedback**

**KEY CONCEPT** Determining the ideal amount of feedback and the most effective manner in which this feedback is provided will be influenced by the specific needs of the learner and the characteristics of the relevant movement skill.

---

**Frequency of feedback**

Frequency refers to how often a coach provides augmented feedback. Frequency can be measured as an absolute value (the total number of times feedback is provided) or a relative value (the percentage of the learner's practice efforts for which feedback is provided). It's impossible to say with certainty what the perfect feedback frequency is to maximise skill learning. However, the following principles should be considered.

- **Feedback should be provided regularly to facilitate skill acquisition.**
- **Provide more feedback in the early stages of learning and less in the latter stages of learning.** A beginner performer needs assistance understanding when they have made skill errors and a beginner also needs to be given strategies to correct these errors.
- **Too much feedback can lead to information overload, particularly in the early stages of learning.** Performers in the cognitive stage of learning need to dedicate a substantial amount of attention to understanding the basic mechanics of a new skill, as well as engage in a trial-and-error learning style. If the coach provides feedback too frequently, they risk compromising the learner's attention as well as disrupting their learning style.
- **Too much feedback in the latter stages of learning can lead to the learner becoming overly dependent on the coach's guidance to experience success.** As the learner becomes more competent in skill performance, it’s important they learn to use their own intrinsic feedback to detect skill errors and put in place strategies to correct these errors. A low level of feedback frequency can reduce the standard of performance in training, however it aids enquiry-based learning and results in better transfer of learning to the games environment.

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**FIGURE 4.33** It’s important that athletes don’t become overly dependent on the coach’s feedback.
An effective strategy regarding feedback frequency is for the coach to only provide feedback after they watch a series of skill attempts. This is referred to as summary feedback. The advantage of summary feedback is that it allows the coach to address and prioritise the most significant and underlying causes of skill error. This will increase the chances of improving skill performance and reduce the occurrence of information overload. Summary feedback also allows the learner sufficient time to attempt the coach’s corrective strategies, as well as cross-reference these changes with their own intrinsic feedback.

Further to summary feedback, other forms of feedback that facilitate skill development and encourage participants to be independent learners are:

**Faded feedback**
Feedback frequency is high at the beginning of a practice session but is progressively reduced the longer the session goes on. Learners initially process a relatively high amount of information regarding correct skill execution but are then given time to practise and apply this information.

**Bandwidth feedback**
The coach and athlete agree on an acceptable bandwidth of performance or margin of error. Precise, quantitative feedback is only supplied if the athlete’s performance falls outside these margins; for example, a swimmer’s 100-metre training splits are five seconds too slow.

If the performance is within the bandwidth, the athlete is offered qualitative feedback; for example, ‘well done, your 100-metre split times are excellent’. How the bandwidth is set is influenced by the learner’s relative level of skill development; that is, an elite performer may have a narrow bandwidth, whereas the coach may accept a wider margin for error for a novice performer.

**Performer-regulated feedback versus coach-regulated feedback**
Performer-regulated feedback is feedback provided at the athlete’s request. This kind of self-regulated feedback is more suited to experienced performers. Often an elite performer is the best judge of the causes of their own skill errors and, as such, can
request the most pertinent information to facilitate skill correction. Otherwise, for less experienced or novice performers, it is best that an experienced coach regulates the type and amount of feedback given to facilitate effective skill learning.

**Timing of feedback**

Timing of feedback refers to when augmented feedback is provided to the learner in relation to their performance. For feedback to be effective, it should be accurate, relevant and immediate. The immediacy of feedback refers to the idea that feedback should be given to the learner soon after their performance, while the relative success or failure of skill execution is still fresh in their mind. Therefore, the timely provision of feedback allows the learner to address skill errors and make appropriate skill adaptations.

If the learner received corrective feedback several days after their initial performance, they would be less likely to contextualise this information, less motivated to make the suggested changes and consequently unlikely to improve.

Feedback can be given at the completion of a skill (terminal) or during the performance of the skill (concurrent).

**Terminal feedback**

Terminal feedback is information that is given at the completion of the skill; for example, a tennis coach watches his/her player perform a serve and then provides feedback regarding the positioning of the ball toss.

Some considerations regarding the use of terminal feedback are:

- The advantage of terminal feedback is that it enables the performer to give their full attention to the coach. This is particularly important for the novice performer who finds it difficult to listen to and process feedback while performing a skill.
- It is recommended the coach momentarily delays the delivery of feedback post skill performance as this allows the learner to first attend to and evaluate their own intrinsic feedback regarding their performance. The learner can then cross-reference their intrinsic feedback with the coach’s augmented feedback and increase their capacity to make positive change.

**FIGURE 4.35** Terminal feedback: feedback given at the completion of skill performance
Concurrent feedback

Concurrent feedback is information given during the skill performance; for example, a rowing coach speaks to their athletes as they row on a waterway. The athletes are able to hear the coach's feedback and make the appropriate skill adjustments whilst they are rowing.

Advantages of concurrent feedback include:

- It can have an immediate impact on skill performance.
- It can provide greater opportunity to receive feedback; that is, the performer does not have to wait until a designated rest period before receiving information regarding skill fault correction.
- In physical, continuous sports such as rowing, cycling, and kayaking, it's important that training intervals are not interrupted. Concurrent feedback allows a coach to provide important information regarding skill performance without compromising the physiological benefits of the training session.

Concurrent feedback should not be used if it distracts the learner and deflects their attention from performing the basic skill mechanics. This is more likely to be the case in the early stages of learning. Coaches should be wary of using concurrent feedback if it reduces the performer's use of intrinsic feedback.

Even though Lydia Lassila's ski jumps last for just a few seconds, she is still able to receive and process concurrent feedback from her coach. The coach yells instructions to cue the appropriate timing of key components of the skill performance.
### Frequency and timing of feedback

**TABLE 4.5** Summary table of feedback use in relation to the type of learner

<table>
<thead>
<tr>
<th>Type of learner</th>
<th>Novice</th>
<th>Intermediate</th>
<th>Elite</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of feedback</strong></td>
<td>Knowledge of results Qualitative Correct Prescriptive</td>
<td>Knowledge of performance Qualitative Correct/Incorrect Prescriptive</td>
<td>Knowledge of performance Quantitative Incorrect Descriptive</td>
</tr>
<tr>
<td><strong>Frequency of feedback</strong></td>
<td>Higher frequency Faded feedback</td>
<td>Lower frequency</td>
<td>Summary feedback Performer-regulated</td>
</tr>
<tr>
<td><strong>Timing of feedback</strong></td>
<td>Terminal</td>
<td>Terminal/Concurrent (task dependent)</td>
<td>Terminal/Concurrent (task dependent)</td>
</tr>
</tbody>
</table>

**TEST your understanding**

1. Compare and contrast the ideal feedback frequency for a novice performer with that for an expert performer.
2. Identify and outline three considerations when deciding whether concurrent or terminal feedback is most appropriate for facilitating skill learning.
3. Why is it important that an athlete does not become overly reliant on their coach’s feedback to facilitate a successful performance?

**APPLY your understanding**

4. Watch a sports practice session or a PE lesson. Observe the following:
   (a) How often does the coach provide feedback to the participants?
   (b) What is the main form of feedback — knowledge of performance or knowledge of results, verbal augmented feedback or performers reliant on intrinsic feedback?
   (c) Was the majority of feedback provided during performance (concurrent) or at the completion of the skill performance (terminal)?
   (d) Did the learner’s performance improve in response to feedback or was the feedback a distraction that ultimately compromised their performance? Reflect on the feedback given during the practice session. Discuss how the type of feedback, the frequency of the feedback and the timing of the feedback could be changed in order to further enhance skill learning.

5. **Practical Activity: juggling**

   The aim of this learning activity is to investigate the effect feedback timing has on skill learning.

   - **Equipment:** Juggling balls
   - **Method:** Your teacher will give you some basic instruction on how to three-ball juggle and/or display a short video demonstration. Students work in pairs. One student tries to juggle while the other plays the role of coach.
   - **Pre-test the juggler:** how long can they juggle continuously before they drop the balls?
   - **Post-test the juggler:** at the end of a double period or after several lessons of practice, test the juggler once more.

   **Trial conditions**
   Divide the jugglers into two groups. One group completes trial 1 conditions and the other group trial 2.
   - **Trial 1:** Coaches can only provide feedback while their partner is attempting to juggle.
   - **Trial 2:** Coaches can only provide feedback while their partner is resting. Coaches can film their partner and refer to the footage in rest breaks if they wish.

   **Results:** Record and analyse the results for each trial for your entire class.

   **Discussion**
   (a) Classify the type of feedback received in trial 1 and the type of feedback received in trial 2.
   (b) What type of feedback was more influential on skill learning? Explain why you think this is the case.
   (c) In which trial did you think the feedback was more frequent? Do you think this helped skill learning or hindered it? Explain.
   (d) As the juggler, did video analysis help you learn the skill? What other types of feedback would be effective in this learning scenario?
### KEY SKILLS

- Discuss how skill classification affects the selection of appropriate practice strategies
- Participate in, observe and record the characteristics of different types of practice strategies
- Perform, observe, analyse and report on the role of feedback in improving performance through practical-based activities

### UNDERSTANDING THE KEY SKILLS

To address these key skills, it is important to remember the following:

- Skill classification describes the type of skill in terms of precision of movement (fine or gross), the predictability of the performance environment (open or closed), whether it is complex (multiple sub-routines) or whether it is continuous or discrete
- Practice can be designed and organised in many different ways: massed, distributed, blocked, serial or random
- Different types of practice suit different types of skills; for example, complex or highly fatiguing skills are best suited to distributed practice
- A coach/teacher should decide upon the type of feedback provided, feedback frequency and the timing of the feedback based on the classification of the relevant movement skill and the participant/s stage of learning
- Appropriate practice and feedback facilitate effective movement skill learning.

### PRACTICE QUESTION

1. (adapted from 2014 ACHPER Trial Exam, question 5)
   - (a) **Define** the difference between open and closed skills, using examples from the sport of hockey. *(2 marks)*
   - (b) Using your examples from part a, **outline** what would be the ideal **type of practice** to enhance a closed skill and the ideal type of practice to enhance an open skill. **Explain and contrast** how these different types of practice help to enhance the respective open and closed skills. *(4 marks)*
   - (c) **Describe** the **type of feedback** elite hockeyroo Anna Flanagan would use while playing a match and **explain** how she would utilise this feedback to enhance her skill performance. *(5 marks)*

### SAMPLE RESPONSE

(a) A closed skill is performed in a predictable environment and is self-paced; for example, a free hit or a penalty stroke. An open skill is performed in an unpredictable environment and is externally paced; for example, dribbling the ball around a defender.

(b) Random practice has a high level of practice variability, provides a less predictable and challenging environment and is therefore suited to developing open skills. Blocked practice involves working on a single skill in isolation for a period of time. Blocked practice provides a stable and self-paced practice environment and is therefore suited to developing closed skills.

(c) Anna would be reliant on concurrent augmented feedback from her coach on the sideline, as well as her own intrinsic feedback; for example, Anna can feel when she has struck the ball with the appropriate speed and accuracy. As an experienced hockey player, Anna can process her coach’s instructions while playing and further enhance her skill performance and her contribution to the team’s success.

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**HOW THE MARKS ARE AWARDED**

- **2 marks:** define open and closed skills. No marks will be given without an example of the appropriate skill from hockey.
- **2 marks:** random practice suits open skills and blocked practice can suit closed skills.
- **2 marks:** explain the differences in practice variability between random and blocked practice.
- **1 mark:** acknowledge Anna is an experienced performer.
- **2 marks:** for two types of feedback: concurrent and intrinsic.
- **2 marks:** for providing examples for each type of feedback.
CHAPTER REVIEW  PRACTICE AND FEEDBACK

CHAPTER SUMMARY

Practice

Amount of practice
- In the interest of effective skill learning, a coach should endeavour to maximise the time the learner spends actively engaged in practice.
- Coaches should carefully monitor ‘time on task’. Equal time should be apportioned to all relevant skills and coaches should be aware that their athletes may become disengaged and less motivated if they spend too long on one task.
- The principle of ‘diminishing returns’ dictates that as the level of skill performance increases, the relative rate of skill learning diminishes.

Practice distribution
- Massed practice involves participants rehearsing for one continuous period of time, with few or no rest breaks. Massed practice suits highly motivated, competent performers.
- Distributed practice involves breaking practice sessions up into shorter work periods, interspersed with substantial rest periods. Distributed practice is well suited to the novice performer and the performer who lacks concentration and/or motivation. Distributed practice is also ideal for learning a complex skill or a skill that is highly fatiguing. The rest breaks in distributed practice help the performer to consolidate their learning.

Practice variability
- Practice variability refers to the degree to which a coach varies practice conditions, as well as the number and variety of skills that are practised in a particular session.
- Practice variability develops versatile, game-applicable movement skills and improves decision-making and game sense.
- Random practice involves a high degree of practice variability. Random practice is well suited to the experienced performer and is particularly applicable to open sports.
- Serial practice involves an intermediate level of practice variability. Serial practice involves regularly changing the skill being rehearsed but in a set and predictable order.
- Blocked practice has very low levels of practice variability. Blocked practice involves working on the same skill in the same practice conditions, in a stable and predictable environment for an extended period time. The novice learner is well suited to blocked practice.
- Low practice variability is generally the most efficient way for a novice performer to learn a new skill; that is, the performer can learn the basic mechanics of the skill with few or no distractions.
- As a general rule when organising training sessions, there should be low levels of practice variability for participants in the early stages of learning, whereas there should be high levels of practice variability for participants in the latter stages of learning.
- Practice variability should reflect the physical and cognitive demands of competition.
- A coach can enhance the performance of a closed skill by regularly varying practice conditions.
- Practice sessions for closed skills should involve the athlete planning the movement skill, executing the movement skill and evaluating the outcome of the movement skill.
- Deliberate practice is a highly structured form of practice, aimed at enhancing a designated skill’s performance. Deliberate practice is repetitious, involves a degree of difficulty appropriate to the learner and allows for the provision of feedback to correct skill errors.
- Deliberate play involves participating in an activity or game loosely based on an established sport. The rules are designed by and for the participants, with the primary objective of having fun. This discovery-based learning environment allows the participants to trial and develop different movement skill techniques.

Feedback
- The role of feedback is to motivate the learner, correct skill errors and reinforce successful performance.
- Different types of feedback suit different types of tasks and different stages of learning.

Types of feedback
- Intrinsic feedback is information the performer receives from their sensory systems: for example, how it feels when the cricket ball strikes the middle of the bat.
- Augmented feedback is feedback received from an external source; for example, a coach yelling instructions from the sideline.
Knowledge of results is feedback relating to the outcome of a skill performance; for example, in AFL, whether the football went through for a goal or a behind.

Knowledge of performance is feedback relating to how a skill is performed; for example, a golfer can feel their bodyweight shift effectively from their back foot to their front foot during a golf swing.

Qualitative feedback is a general form of feedback regarding skill performance and/or a form of encouragement; for example, a tennis coach compliments a player for ‘reaching high’ during the service action.

Quantitative feedback is a precise form of performance feedback involving numerical values; for example, a tennis coach informs their player ‘your arm was 10 degrees off vertical at the top of the service arc’.

Qualitative feedback suits the novice, whereas quantitative feedback suits the experienced athlete.

Frequency of feedback
- Frequency of feedback refers to how often a coach gives feedback.
- As a general rule, a novice performer will require more frequent feedback than an experienced performer.
- An elite performer requires less frequent, but more precise, feedback.
- A coach must be careful not to overload the novice performer with information.
- If feedback is consistently too frequent, there is a risk the athlete will become overly dependent on the coach to facilitate successful performance.
- The goal of the coach should be to develop autonomy in their learners, an ability to use their own intrinsic feedback to enhance performance, particularly during competition.
- Summary feedback enables the coach to address the underlying causes of skill error and allows the learner to rehearse a number of skill attempts before having to process further performance feedback.

Timing of feedback
- Timing of feedback refers to when the coach gives feedback relative to the skill performance.
- Feedback can be concurrent (during the performance) or terminal (at the completion of the performance).
- Concurrent feedback may be a time-efficient means of improving an experienced athlete’s performance, however it can compromise a novice performer’s attention to skill execution.
- Terminal feedback allows the athlete to give the coach their undivided attention and is well suited to the novice performer.

EXAM PREPARATION

MULTIPLE-CHOICE QUESTIONS

1. The term ‘diminishing returns’ in skill acquisition refers to
   - (A) a learner’s state of arousal and preparedness to learn.
   - (B) the notion that massed practice diminishes skill development.
   - (C) the principle that the more competent the performer, the harder they must practise for further improvement in skill performance.
   - (D) the principle that the less competent the performer, the harder they must practise for further improvement in skill performance.

2. Random practice is best described as
   - (A) predictable and repetitive.
   - (B) highly varied practice involving numerous skills.
   - (C) working on one skill in several different ways.
   - (D) practice that suits less-fatiguing skills.

3. A soccer player watches his penalty kick sail past the keeper and into the back of the goal net. This is an example of which type of feedback?
   - (A) Intrinsic feedback, knowledge of results
   - (B) Augmented feedback, knowledge of results
   - (C) Intrinsic feedback, knowledge of performance
   - (D) Concurrent feedback

4. Amy is a 10-year-old circus-skills student learning to juggle for the first time. What type of feedback and feedback frequency should Amy’s instructor use to facilitate effective skill learning?
   - (A) Infrequent, concurrent feedback
   - (B) Athlete-regulated, terminal feedback
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(C) Infrequent, terminal feedback  
(D) Summary, terminal feedback

5 Blocked practice can assist  
(A) in the development of game sense.  
(B) a novice performer to become familiar with the basic mechanics of a new skill.  
(C) in adding a high degree of practice variability.  
(D) in the simultaneous development of many skills.

6 Immediately after a training session, a coach shows a swimmer a video of her stroke and discusses strategies to enhance performance. This is an example of which type of feedback?  
(A) Concurrent, intrinsic  
(B) Concurrent, augmented and knowledge of results  
(C) Terminal, augmented and knowledge of performance  
(D) Concurrent, augmented and knowledge of performance

7 James is taking part in Little Athletics and learning to high jump using the Fosbury Flop technique for the first time. Which of the following would be the most appropriate practice structure and the most effective type of feedback?  
(A) Distributed practice and summary feedback  
(B) Massed practice and summary feedback  
(C) Massed practice and incorrect feedback  
(D) Distributed practice and incorrect feedback

8 When coaching hockey players to improve their penalty strokes, the coach should  
(A) vary the practice conditions.  
(B) organise blocked practice to replicate effective technique.  
(C) ensure the physical and cognitive demands of practice are similar to those in a match.  
(D) make the player practise visualisation.

9 Deliberate practice can be best described as  
(A) structured, goal-orientated practice involving repetitive rehearsal and augmented feedback.  
(B) 10,000 hours of physically and mentally demanding rehearsal.  
(C) a self-discovery learning environment, allowing the learner to experiment with different skill techniques.  
(D) the foundation for any athlete to reach sports expertise.

10 A rowing coach providing technical information from a speedboat to his moving crew is an example of  
(A) concurrent feedback regarding knowledge of results.  
(B) terminal feedback regarding knowledge of performance.  
(C) terminal feedback regarding knowledge of results.  
(D) concurrent feedback regarding knowledge of performance.

TRIAL EXAM QUESTIONS

Question 1  
(ACHPER Section B, 2015, question 3)

The Davis Cup Tennis competition is different from any other tennis competition in that not only do players represent their country in a team format, but the team and coaches also sit on the sidelines during the matches.

a. Define feedback and provide an example of two types of feedback that players would rely on during a Davis Cup match to improve their performance.  
   4 marks

b. In tennis, one of the most difficult and complex skills to master is the serve. Explain two types of practice that would increase the learning and mastery of a tennis serve.  
   4 marks

Question 2  
(ACHPER Section B, 2013)

Cricket, unlike many other team sports, does not provide many opportunities for players to receive feedback from coaches during play.

a. Define and provide an example of the main type feedback that a batsman would rely on while out in the middle.  
   2 marks

b. Outline three key roles feedback plays in any sport.  
   3 marks
Question 3  (ACHPER Section B, 2014, question 5)

a. Outline the difference between open and closed skills, using examples from the game of hockey to support your response.  
   2 marks

b. What is the type of feedback a hockey player would rely on while playing in a game?  
   Provide an example of this type of feedback in your discussion.  
   Suggest how and when a coach could use the following types of practice in hockey for maximal benefit:  
   Random practice  
   Massed practice  
   4 marks

Question 4  (ACHPER Multiple choice 2015, question 15)

An AFL footballer watching video footage of themself kicking for goal is an example of  
A. internal feedback.  
B. knowledge of results.  
C. knowledge of results and performance.  
D. knowledge of performance.

Question 5  (ACHPER Multiple choice 2013)

Under which of the following circumstances might massed practice be most appropriate?  
A. When the performer is in the cognitive stage of learning and requires feedback between each effort  
B. When the skill is complex in nature  
C. When the athlete’s motivation is high  
D. When the physical demands are high

Question 6

A tennis player is told the following by her coach: “You need to keep your feet shoulder width apart when you hit the ball”. This is an example of  
A. knowledge of performance.  
B. knowledge of results.  
C. sensory feedback.  
D. kinaesthetic feedback.

Question 7  (ACHPER Multiple choice 2014)

A golf coach records the swing of his athlete and uses it to replay and slow down key aspects of the technique that need reinforcement or modification. This is an example of which type of feedback?  
A. Knowledge of performance  
B. External feedback  
C. Knowledge of results  
D. Both A and C