The six feedback and learning phases

1 Intrinsic feedback

Intrinsic information is associated with the feel of the movement as it is being performed. It is also called *kinaesthetic feedback* and is detected by proprioceptors, which are present in muscles, tendons and joints.

Intrinsic feedback cannot readily be deployed during the cognitive stage of learning (see pp. 22–25), but develops during the associative stage. It is utilised best from the onset of the autonomous stage, helping to correct movement during performance. For example, a pole vaulter will make small adjustments to their action and body shape during flight.

Kinaesthetic feedback replaces the need for conscious control. While this helps fluency of movement, it also allows the autonomous performer more attentional space, allowing supplementary tasks to be undertaken simultaneously.

2 Extrinsic feedback

Extrinsic information is detected by the learner from an outside source, e.g. the coach or teacher. It involves the learner hearing or seeing information, and can be positive or negative.

An extrinsic input can support intrinsic feedback but is best administered at the cognitive stage of learning when novice performers have yet to develop kinaesthesis.

3 Positive feedback

Positive feedback is given or received when a skilled movement is performed correctly. Input can be intrinsic or extrinsic but in either case it is used to reinforce the action. In order to be effective, delivery must be precise and specific to the skill.

Positive feedback is useful for motivating learners during earlier learning phases and most helpful as a teaching aid at the cognitive level. For example, a teacher might praise the correct pattern of movement after a successful volleyball spike.

It is less effective at the autonomous stage because mistakes require detailed analysis to facilitate progress at higher levels, e.g. if hands slip during the pulling phase in a butterfly stroke, the elite swimmer will be less efficient.

During all phases of learning, positive feedback loses impact if overused.

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4 Negative feedback

Negative feedback is given or received when the skilled movement is incorrect. It can be intrinsic or extrinsic, and is used to eradicate bad habits.

Negative feedback can be facilitating at the autonomous stage, when the athlete is finely tuning a skill. With careful use it can motivate elite performers and help them remain at the autonomous level.

If overused, negative feedback can hinder progress at any learning stage.

5 Knowledge of results

Knowledge of results (KR) concerns information about the outcome of an action. It allows skills to be modified or upgraded. KR can be positive or negative, but is always extrinsic.

KR is useful during all phases of progress, but for different purposes. For example, during cognitive learning a dancer would need to focus on foot position to confirm correct placement. However, at the autonomous stage, a footballer, on seeing a pass was accurate, can decide on a subsequent supporting move.

In general, KR is most useful in open-skill execution (see pp. 8–12), as the outcome and not the quality of movement is the criterion of success, e.g. the successful football pass. However, KR is not useful in some closed skills, e.g. a gymnastic vault, because performance is judged on quality of movement and not solely on outcome.

6 Knowledge of performance

Knowledge of performance (KP) tends to be detected intrinsically and is referred to as the 'feeling tone' of the skill. It concerns the quality involved in movement and informs the performer whether the skill movement is correct or not in terms of articulation.

KP operates at the autonomous stage, as it allows quick correction and is good for modifying overlearned skills. It is based on technique and helps to make a comparison between previous and current performance. Detection is made during skill execution. KP is vital for elite performance but cannot be utilised during earlier learning phases.

In general, KP is most useful in some closed skills when performance is judged on quality of movement. For example, a gymnast will utilise KP to control movement quality during a pommel horse sequence.

However, kinaesthesis is also central in open-skill performance, e.g. KP allows the correct weight to be applied when passing the ball in hockey. Autonomous players will develop KP to enable delicate touches, e.g. batters in cricket apply 'soft hands' to steer the ball away from fielders and complex body movements like goalkeeping diving saves are only possible when kinaesthesis is fully developed.

KP is acquired through experience, therefore it takes a long time to develop. For some aspirants, long learning processes are demotivating, preventing progress towards expertise.

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