

How Much Teaching is Necessary For Optimal Learning of Football Skills?: The Role of Discovery Learning

KEITH DAVIDS

In a previous issue of "Insight", one of the key points highlighted is that coaches need to use a variety of techniques to encourage learning in footballers.

When directly instructing players, it was suggested that verbal instructions should be kept to a minimum. Also, the use of non-verbal sources of information should be highlighted, such as when watching a demonstration or when highlighting what a movement actually feels like. But does the coach need to be on hand all the time to direct the learning of the footballer? This article addresses whether learning can take place when players practise skills by themselves.

In order to answer this question, we need to distinguish between the processes of learning and the processes of coaching.

To recap, learning movement skills:

- occurs over a long period of time as a result of lots of practice
- Is not directly observable but is implied from changes in performance
- is more or less permanent
- involves developing effective solutions for specific task goals (e.g., shooting, dribbling, heading).

On the other hand, many previous articles in "Insight" have shown that sound coaching is based on an effective use of practice time by players. Therefore, coaching typically refers to those techniques which are used by coaches to:

- instruct players in tactics and strategies
- show players how to perform a skill
- integrate players into an organised team.

Discovery Learning: A 'Constraints-Led' Approach to Practice

There is growing evidence that, in many instances, effective learning can take place without the direct intervention of the coach. In practice conditions where there is little intervention by the coach, players are said to be engaged in discovery learning. A classic

example of discovery learning in football occurs in practice conditions where learners, on their own, experiment with different ways to strike a dead ball towards a goal. They can become absorbed in practising different types of spin, sometimes with swerve and dip added. During learning of this nature, different parts of the foot could be used and the effect on the ball noted. The importance of discovery learning is based on research with children and adults which shows that, when set clear task goals, and left to their own devices, most learners can be very resourceful in finding appropriate solutions. More often than not, discovery learners can show similar levels of eventual performance outcomes as players who receive direct instruction. Additional benefits of a less prescriptive approach to learning, including an increased motivation to learn and higher levels of resistance of skills to stress, have been noted.

Until recently, the processes underlying discovery learning were little understood. Discovery learning can be broadly defined as the processes by which players are allowed to search for and discover relatively unique solutions to movement problems without direct instruction from a coach. It can be seen as part of a wider tendency in education and learning to respect individual differences, and to recognise the different influences or constraints which have shaped the way that individual learners approach a task. Coaches should understand that these influences have been called 'constraints' because they guide or channel the way that learners solve movement problems.

In discovery learning, understanding what the major constraints are on learners at any one point in time is an important job for the coach. One useful approach is to break down constraints into three major categories related to the individual learner, the background environment of the learner and the specific task at hand (see Figure 1).

A 'Hands-off Approach to Coaching

With respect to the idea of discovery learning, the coach needs to understand what the important task constraints are on the learner. Of course, a major task constraint is the information that players use to perform a movement. Consider the example of crossing a ball on the run. Footballers can rely on a variety of information sources to control the ball, including visual information on current position, speed and direction of the ball and the location of other players. Also present is information from skin, muscles and joints gained when touching the ball. This information from the body becomes useful, for example, when wingers look up from the ball to pick out a target player in the box. In this situation, coaches cannot instruct players on the meaning of information about the position of foot and the ball. It has to be discovered. There are many other useful sources of information present for the learner in football, and so coaches should devise practices which allow players to explore the meaning of these other sources. Many coaches use non-standard practice equipment such as 'dribble-aids' to block out vision of a dribbled ball for this reason. The broad point is that, by devising practice sessions which emphasise or de-emphasise some types of information for learners, the coach is forcing them to find and use other relevant sources for themselves.

What else does discovery learning imply for the football coach? Does it imply that they can look forward to a long life on the dole queue? Not at all! During discovery learning it appears that the coach's role is rather different to more traditional, direct approaches. A less prescriptive, instructional approach to learning signifies that coaches need to become very familiar with the task constraints in different phases of football, with their emphasis on different skills. This approach challenges the coach to be highly creative in designing

practice games and conditions, which allow desired skills to emerge in learners. This approach emphasises the uniqueness of players, rather than fostering the idea that there is a single recipe book for success in football. In discovery learning, clearly, the most important challenge facing the coach concerns how to structure practice sessions in order to provide opportunities for individual players to search and discover movement solutions for themselves. Conditioned games are an excellent means to encourage this type of exploration by players. Using one- and two-touch practices and implementing constraints like scoring only with the head or shooting first time, are useful techniques to promote discovery learning. Other constraints which can be used for discovery learning involve setting tight time-constraints for practice tasks, using opposition in most practices and using pitch markings to challenge players.

Summary

- Coaches should decide on a series of football-related practice activities, emphasising different skill needs, which can help learners to practise on their own or with a partner. Ensure that there is a tight fit between the constraints on a player on match day and the constraints experienced in practice.
- Give players some time to explore and exploit the relevant sources of information for performing key tasks. For example, the best players quickly learn that they don't need to look at the ball or their feet all the time when dribbling. Challenge learners to use other important sources of information such as that provided by skin, muscles and joints of the legs and feet. Vision can then be used for more strategic purposes such as scanning defensive positions or picking out the runs of teammates.
- Value variability! The constraints-led approach to discovery learning implies that most learners will search a task actively and come up with a relatively unique and reasonably approximate movement solution to the problems that the coach sets them. Remember that nobody coaches an infant to walk by means of direct instruction. Parents typically provide a safe 'practice environment for their children to learn to stand and then walk. If you observe infants learning to walk, you will see that they constantly explore different ways of moving from A to B. When they finally succeed in walking (around 12 months of age), it is clear that they have all solved the locomotion problem in slightly different ways.
- Encourage an inquisitive, searching attitude in learners by keeping instructions to a minimum. Setting up challenging tasks in such a way that learners end up achieving the desired outcomes is the key to successful discovery learning. The art is in designing practice conditions which

channel the learner towards the desired outcomes. These solutions can be fine tuned through more directed practice at a later stage, if required. Problemsolving through actions should be emphasised, rather than precise verbal instructions. In this sense, learning when to keep quiet is as important for coaches as knowing when to instruct.

- Finally, don't just rely on prescriptive coaching methods, nor discovery learning methods alone. Remember that a range of methods should be used by the coach to help develop the skills of groups of learners. Different methods suit different individuals and should be used in different circumstances. In that way, methods are like DIY tools: you need to know which tool to use for which task!

Further Reading

Balan. C.M. and Davis. W.E. (1993). Ecological Task Analysis - An Approach to teaching Physical Education. *Journal of Physical Education, Recreation and Dance*, November-December Issue, pages 54-61. (Published by the American Association for Physical Education, Recreation and Dance).

Keith Davids is a Professor of Motor Control in the Department of Exercise and Sports Science at Manchester Metropolitan University. He has taught and researched on the processes of skill acquisition in sport for over 20 years.

