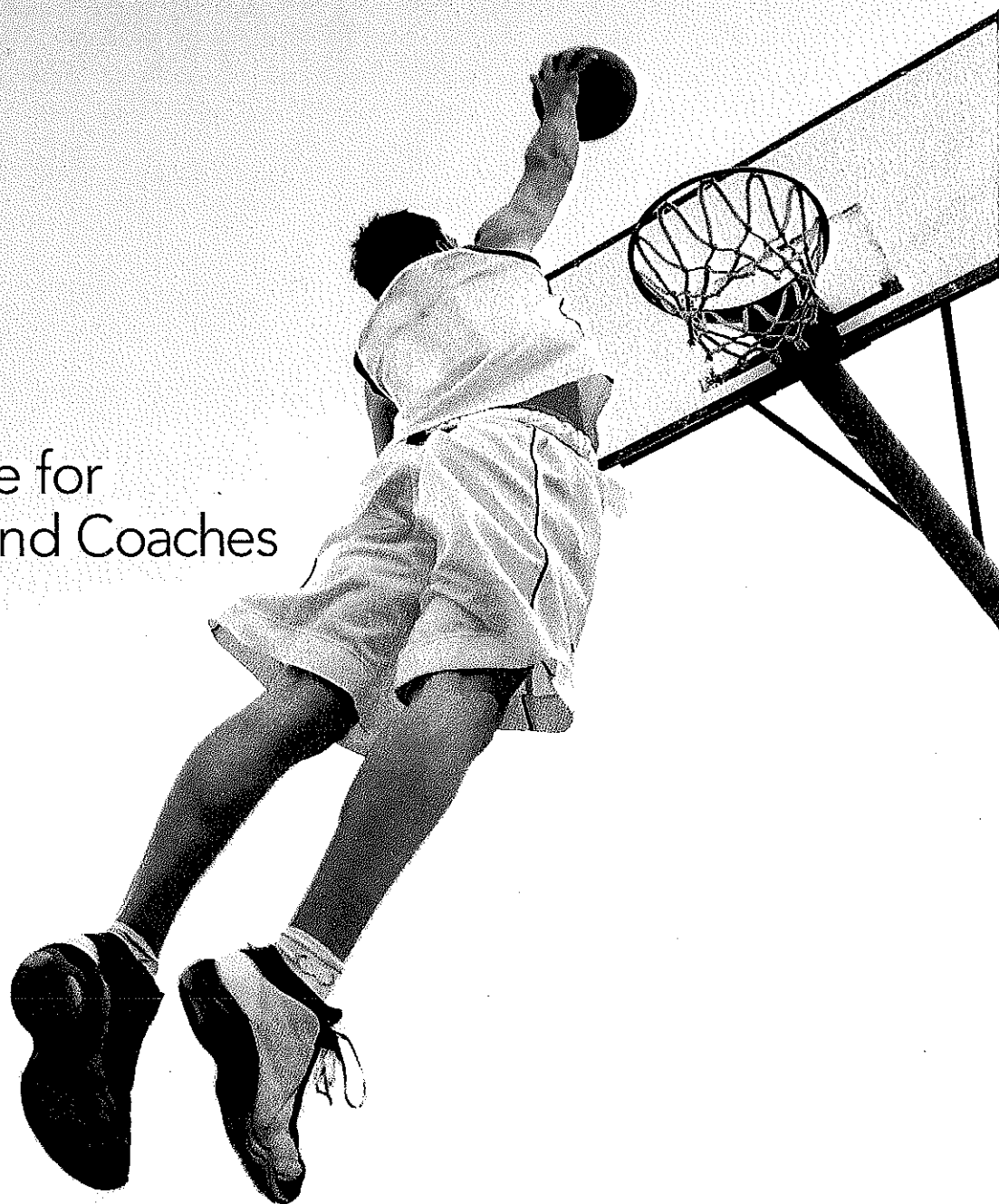


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DEVELOPING **GAMESENSE** THROUGH TACTICAL LEARNING

A Resource for
Teachers and Coaches



RAY BREED & MICHAEL SPITTLE

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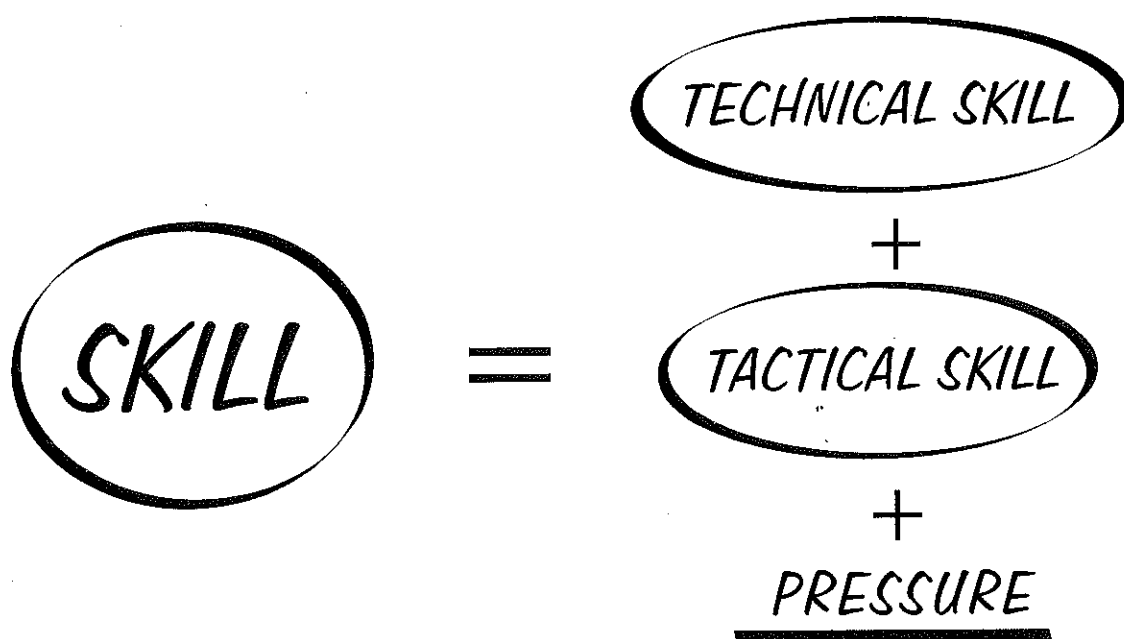
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INTRODUCTION TO TACTICAL LEARNING



Skill is more than just technique.

GAME SENSE

- is an instructional approach to teaching and learning that emphasises the development of tactics and decision making to develop an understanding of the game
- assists players with developing technical skills as they come to recognise and understand their importance within the context of the games.

Game sense aims to address the perceived problems with traditional (technical) methods

of teaching and coaching, including boredom from repetitious skills drills; the fact that well-practised skills often break down when put into a game situation; and that in traditional instructional approaches games are usually presented as discrete activities (that take more time and don't emphasise transfer between sports), even though many games have tactical similarities. Game sense also aims to develop and emphasise enjoyment and fun, teamwork and sportsmanship, and leadership skills through team play and challenges. It encourages active problem solving and a constructivist pedagogy where tactical problems are presented in situated game forms (Fry, Wee Keat Tan, McNeill & Wright 2010; Metzler 2005).

GAME SENSE

- emphasises tactics and decision making
- focuses on the game
- encourages participants to understand how technical skills are important to the game (not isolated from the game)
- develops technical skills within the context a game provides, rather than separate from the game
- progresses from tactical understanding to technical skills or from *why?* to *how?*
- presents generic game forms that develop appreciation and understanding of games
- emphasises the transfer of skills from one game to another
- encourages an understanding of rules and how they shape or influence a game and strategies
- poses questions for participants to solve.

This book introduces an interpretation of game sense that has been developed over a long period of working with game sense approaches in physical education and coaching. It is intended that the approach provided is in a form that will assist teachers and coaches in integrating game sense into their sessions. The approach adopts generic game forms that can be applied to a variety of sports, rather than targeting specific sports.



THE TERMS 'TEACHING' AND 'COACHING' WILL OFTEN BE USED INTERCHANGEABLY IN THIS BOOK. THIS COMES FROM THE PHILOSOPHY THAT THE COACH IS A TEACHER AND EDUCATOR.

Game sense approaches

Game sense approaches to teaching and coaching have evolved over a number of years as teachers and coaches have looked for more engaging ways of introducing and incorporating games into the curriculum. Understanding how to incorporate games effectively into the physical education curriculum is crucial because the teaching of games attracts much of the curriculum allocation in physical education (Peters & Shuck 2009). In fact, it has been suggested that as much as one-half to two-thirds of physical education curriculum time consists of games-related activity (Mandigo, Spence, Thompson, Melnychuk, Schwartz, Marshall & Dunn 2004; Werner, Thorpe & Bunker 1996). The way that games are taught and utilised as educational experiences is, therefore, important to the outcomes of physical education for students (Peters & Shuck 2009). There has been some criticism of the way games experiences have been provided in physical education (Harvey, Cushion, Wegis & Massa-Gonzalez 2010), such as deficiencies in content mastery and content that is irrelevant (Hastie 2003). If used ineffectively, games activities have a reduced educational value in the curriculum. However, if used effectively, games-related activities have the potential to develop technique, tactics, strategies and encourage higher-order cognitive thinking, as well as improved game

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play and participation (Harvey et al. 2010; Light 2002; Peters & Shuck 2009).

Identifying effective ways of utilising games in the curriculum appears to be an important concern for physical educators. It has been suggested that often the complexity of ball games is underestimated, which has led to limited approaches to teaching (Lauder & Piltz 2006), so that the potential of games to develop students has been underutilised. To maximise the potential of games it is essential that students aren't 'just playing games', rather, that the games are educational experiences (Bunker & Thorpe 1986). Research into the teaching of games in Australia has reported that teachers usually adopt a traditional model of instruction with a series of structured lessons, focused on technical skills, usually concluding with a game activity (Ho 2003; Turner 1996; Pearson & Webb 2005). That is, gameplay is usually used at the end of traditional lessons, but this may leave students with a disconnection between the techniques learnt and the game activity. This is partly because the instructional model adopted does not assist teachers and coaches in making connections between the technique and how they are applied in games (Bunker & Thorpe 1982).

The use of minor games can also be problematic, because although they can provide an enjoyable experience for students, they often do little to develop the game play of students or their appreciation and understanding of games. This is because there is often very little relationship between the minor game and the more advanced version of the game (Lauder & Piltz 2006). For example, playing kickball as a lead up to a soccer game. In these modified games, there is also often a lack of progression and

limited transfer of skills to other games. For instance, a number of teachers see game sense in terms of playing small-sided or modified games and believe that they are already utilising a game sense approach simply by playing games (Almond 1986). However, as argued in this book, physical education should not just be about playing minor games or 'let's have a game' (Lauder & Piltz 2006). What is advocated is that games teaching should be more than this; it should develop game players who can make connections and appreciate gameplay. It is not just about taking the kids outside for a fun game. (Although having fun and enjoying playing games is a big part of it – so why not do both?).

Game sense is one instructional approach that can be used to enhance the experience of students in game-based activities in physical education and coaching. Game sense or tactical learning approaches have been advocated for around 30 years now, with most attributing the initial development of such approaches to the work of Bunker and Thorpe (1982) and their Teaching Games for Understanding model (TGfU). In developing their model, Bunker and Thorpe identified a number of limitations to traditional approaches to instruction, including a focus on the development of technique, and little emphasis on tactical understanding and decision making, that is, an emphasis on developing physical skills and movement execution, without taking into account the context in which the skills are performed.

Since the development of Bunker and Thorpe's model, a number of variations of tactical games approaches have been developed. Each of these approaches has subtle differences, but essentially aim to develop tactical understanding and decision

making, utilising a problem solving and questioning approach (Fry et al. 2010). It is recognised that there are different variations of game sense and that some researchers in the field may not agree on the terms used and the variations listed.

VARIATIONS OF GAME SENSE

- *TGfU* (Bunker & Thorpe 1982)
- *Game Sense* (Australian Sports Commission 1999) or *Playing for Life* (Australian Sports Commission 2005, 2010)
- *Play Practice* (Launder 2001)
- *Games Concept Approach* (GCA; in Fry et al. 2010)
- *Tactical-Decision Learning model* (TDLM; Grehaigne, Wallian & Godbout 2005)
- *Tactical Games Approach* (Griffin, Mitchell & Oslin 1997).

All of these game-based approaches to teaching and coaching games advocate playing the game (modified or adapted for the players' abilities) as the central organisational feature of a lesson (Hopper, Butler & Storey 2008). The modified games create constraints that emphasise certain game features in order to develop understanding as students solve the problems they are presented with. Game sense or tactical learning approaches, therefore, incorporate a series of modified games

to engage students in play, which are modified by the coach or teacher to emphasise development of tactical and decision making elements.

Although game sense approaches have been around for a long time and there is an abundance of literature about them, they remain an emerging pedagogy in physical education in Australia (Peters & Shuck 2009). While many coaches and teachers have heard of game sense and have a general understanding of what it aims to do, very few have a thorough understanding of how to implement it in the school curriculum or in a coaching program. It is hoped that the practical framework for teaching game sense provided in this book will assist teachers and coaches in integrating game sense more into their teaching. This book aims to provide a generic game sense model that can be applied to a range of sports. It is hoped that this approach and this book are attractive to teachers and coaches by providing a how to approach with specific examples of games, activities, lesson plans and unit plans, underpinned by the theoretical rationale for adopting game sense approaches in teaching and coaching.



IN THIS BOOK, THE TERM GAME SENSE IS ADOPTED TO REFER TO THIS APPROACH OF TACTICAL LEARNING. THE TERM GAME SENSE IS USED BECAUSE IT REFLECTS MUCH OF WHAT IT IS HOPED LEARNERS WILL ACHIEVE, WHICH IS AN UNDERSTANDING OR SENSE OF THE GAME AND GAME PLAY AND AN UNDERSTANDING OF HOW TO APPLY THEIR SKILLS IN GAMES.

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Teaching Games for Understanding (TGfU) model

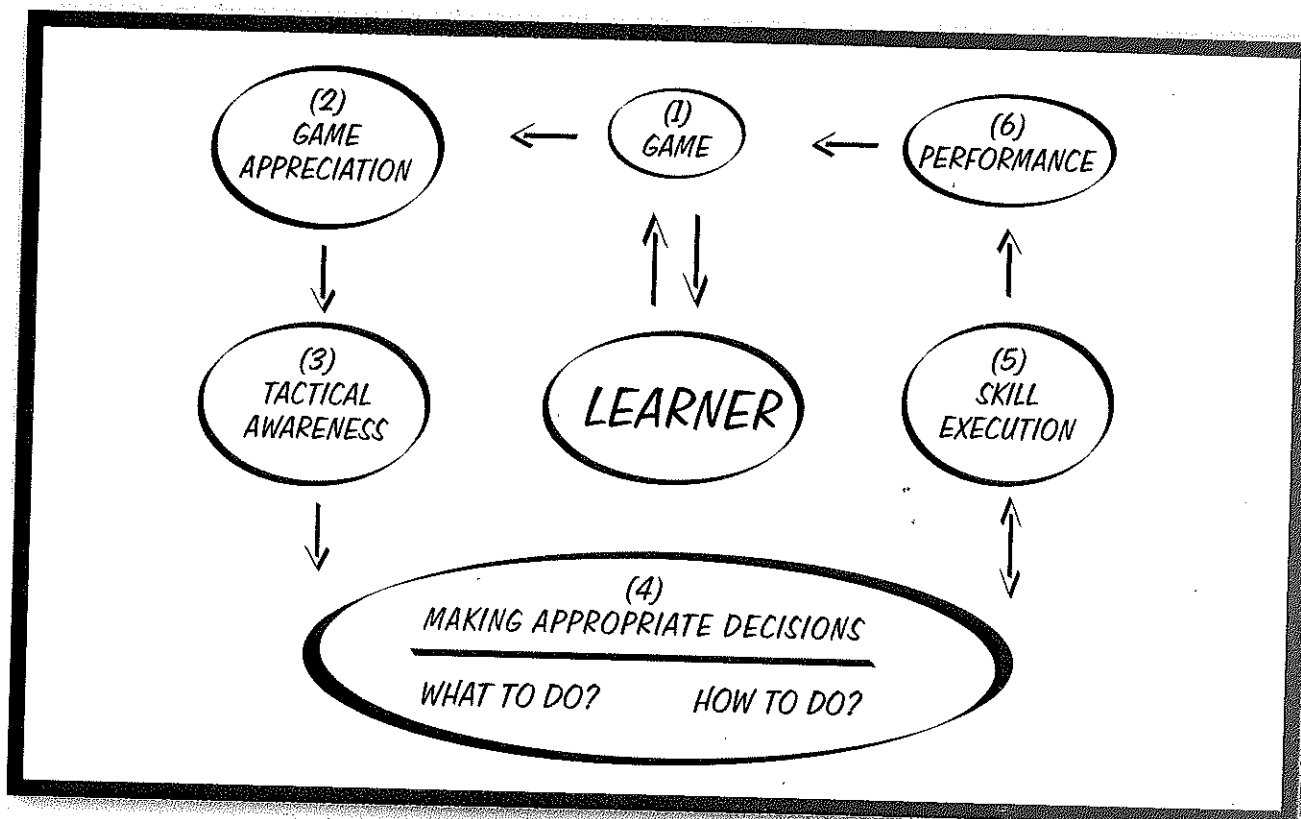
The Bunker and Thorpe (1982) model of Teaching Games for Understanding (TGfU) represents the framework for the development of other game sense approaches and the learning experiences developed for this book. The model was developed from the work on games approaches in response to perceived limitations of traditional approaches to teaching games (Bunker & Thorpe 1982). They felt that traditional approaches tended to concentrate on specific technical skills without considering the contextual nature of games and how they are applied in games. The traditional approach encourages teachers and coaches to focus on teaching *how* to do a skill, before they teach *why*. Bunker and Thorpe (1982) contended that emphasising tactical considerations in a game will encourage students to enjoy games and develop tactical awareness, as well as understand the importance of specific technical skills and when they are required in a game. As players come to understand the game, the game form is modified to challenge the players in their understanding and appreciation, and to develop their tactical awareness, decision making and technical skill execution (Kirk & MacPhail 2002). The modified games are designed to reflect the current ability level of participants, but also to reflect the tactics and decision making of the full adult version of the game. Smaller-sided games can also increase the level of participation of students and the frequency of decision making and skill performance.

In the TGfU model, teaching and coaching occurs within game play (Kirk & MacPhail 2002) where modifications are made to rules, playing area and equipment in order to develop the understanding of players.

The model Bunker and Thorpe (1982) proposed goes through six sequential stages. The model and stages are presented in the diagram on the next page. As is apparent, the learner is placed in the centre of the model. This is because the learner and their developmental level should be the most important consideration, with the games in which they participate appropriately modified to their developmental level.

1- Game

The game is introduced. Students should be presented with a variety of game forms that are appropriate for their developmental level (age and experience). In presenting the games, modifications are made to rules, playing area and equipment in order to present students with problems involved in game play, for example, creating space when in attack or denying space when in defence in invasion games. The modified game form should bear some resemblance to the tactical situations encountered in the full adult version of the game form. The aim is to foster an understanding of the game form, so the modified game should have a specific objective and reflect an understanding relevant to a category of games (Mandigo, Butler & Hopper 2007).



Teaching Games for Understanding (TGfU): The Curriculum Model (Bunker & Thorpe 1982).

2 Game appreciation

Students should understand the rules of the game to be played. Rules place constraints upon what players can do and shape the tactics, decisions and techniques that are part of effective game play. For example, not allowing forward passes in an invasion game adds to the difficulty and requires different tactical approaches. This should build an appreciation of how rules, skills and strategies influence one another (Mandigo et al. 2007).

3 Tactical awareness

Students should be situated in learning tasks that involve them considering and exploring the tactics to be used. Participating in the modified games should help students

understand attacking and defensive tactics to gain an advantage over their opponent. For example, how to create space on the court by using angles in net/wall games. This tactical awareness should also be reflected in being able to identify opposition weaknesses.

4 Decision-making

Expert games players make rapid and accurate decisions. The games should provide players with opportunities to practise their decision making and anticipation of what is happening in the game. This involves understanding and recognising what to do and how to do it. Deciding what to do encompasses assessing the situation by recognising cues and anticipating possible outcomes. Deciding how to do it is about selecting an appropriate

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response, which will be influenced by a number of constraints on performance, such as technical skill level, time available to complete the action and accuracy requirements.

5 Skill execution

Technical skills are developed in the context of the game. They are enhanced as the students come to understand the importance of specific technical skills and when they are required in a game. As students have experienced game situations and understand tactics and decision making they begin to appreciate the importance of technical skill execution in order to effectively execute tactics, as well as how to use specific technical skills in a game situation (for example, a bounce pass landing two-thirds of the way to your target). Skill execution should, therefore, be evaluated in the context of the learner and the game situation.

6 Performance

Performance is the outcome of all the processes combined in the previous steps in the model. The performance outcome should be assessed in regard to performance in more advanced or more representative forms of the game (skill transfer).

Pedagogical principles in TGfU

The model describes the framework and steps in the game sense approach. Thorpe, Bunker and Almond (1984) and Thorpe and Bunker (1997) suggested four fundamental pedagogical principles to be incorporated within TGfU, which are:

- 1 sampling
- 2 modification-representation
- 3 modification-exaggeration

4 tactical complexity.

These are principles teachers and coaches should consider in selecting, developing and modifying games in order to maximise the learning experience for students.

1 Sampling

Sampling is used to develop transfer of understanding between games. As students learn game forms, the strategies and tactics from one game may be transferred to other games in that category. Games can be categorised into various groups by their tactical similarities. The categories of games are invasion games (attacking involves penetrating space to score; defending involves denying space to prevent scoring), striking/fielding games (batting team scores runs by hitting ball away from fielders/fielding team prevents scoring) and net/wall games (the ball is hit away from an opponent until they cannot return it). These categories of games are discussed in more detail in Chapter 3. Sampling implies that games should be selected so that a range of experiences is offered and similarities and differences between games can be discovered, leading to better understanding (Holt, Streat & Garcia Bengoechea 2002). This aids in the development of physical education curricula (Holt et al. 2002). In many resources, games-based approaches in specific sports have been provided, but this should not be confused with TGfU (Holt et al. 2002), which emphasises generic skills that can transfer across sports of a similar type. This book presents a game sense approach that can be applied to a range of sports by using generic game-based activities, aimed at maximising transfer.

Table 1.1 Summary of the four fundamental pedagogical principles to be incorporated within TGfU

PEDAGOGICAL PRINCIPLE	DEFINITION	EXAMPLE
1 Sampling	Using a variety of game forms in order to develop an understanding of similarities and differences between games within a game category.	Understanding the tactical principle of hitting the ball away from fielders to score runs developed by playing a range of striking/fielding games.
2 Modification-representation	Creating and modifying games so that they are representative of the tactical, decision making and/or skill execution situations present in more advanced game versions. Thus, students experience and are exposed to situations that develop tactical awareness and technical skills.	The tactic of hitting the ball away from an opponent in a game of four square is representative of the same tactic that is used in more advanced or sport-specific net/wall games, such as tennis or badminton.
3 Modification-exaggeration	Modifying, creating or using a game to exaggerate the tactical concept.	Exaggerating the idea of creating space in an invasion game by having more attackers than defenders.
4 Tactical complexity	Matching the task difficulty of the game to the developmental level of the students. There should be a developmental progress. Tactical complexity should progress with learning and the challenges set for students to solve as understanding develops.	Increasing the complexity in invasion games by moving from a 2v1 game to a 4v2 game.

2 Modification-representation

Modification-representation is a principle whereby games are created and modified in ways that are developmentally appropriate and contain similar tactical structures to the adult game (i.e. they are representative of the skills and tactics used in the more advanced versions of the game). This allows students to experience situations that require similar tactical, decision making and/or skill execution solutions to more advanced games and also to other games within the same game category. This means that students will be able to play a game even if the adult version of the game is still beyond their current ability level (Holt et al. 2002).

3 Modification-exaggeration

Modification-exaggeration requires the teacher

or coach to develop a focus for an activity, and then modify, create or use a game to exaggerate that focus. This is important to assist students in understanding the tactical concepts. For example, the idea of changing the depth of shot in net/wall games can be exaggerated by making the court long and narrow.

4 Tactical complexity

The tactical complexity of the game should be matched to the developmental level of the students. That is, the starting point would be using games with less tactical complexity and then increasing complexity as understanding develops. Thus, there should be developmental progress in tactical understanding and the challenges set for students to solve.

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Based on the TGfU model of Bunker and Thorpe (1982), a practical approach to the use of games in teaching and coaching has been developed. In the next sections, some of the reasons why game sense is effective will be discussed, as will some of the potential learning outcomes that have been attributed to game sense approaches to teaching and coaching.

WHY IS GAME SENSE AN EFFECTIVE LEARNING TOOL?

There are a number of reasons that have been put forward to advocate why game sense and tactical learning approaches are effective for learning. These reasons have a basis in understanding of:

- how we control movement (motor control)
- how we learn and acquire skills (motor learning)
- our comprehension of teaching and learning in physical education (pedagogy).

In this section, some of the principles from motor control, motor learning and pedagogy, which support the use of game sense as an instructional model, are briefly explored.

Motor control principles

There are a number of different theories or models around how we control movement and make decisions for action in movement settings. These include:

- 1 information-processing models (which focus on the processing of information leading to a decision and execution of skill)
- 2 motor program based theories (which give importance to instructions provided by a central representation stored in memory, such as a motor program)

- 3 dynamic systems views and constraints-led approach (which focus on the self-organisation of movement based on learner, task and environmental constraints).

Each of these models provides some understanding for the use of game sense in teaching and coaching.

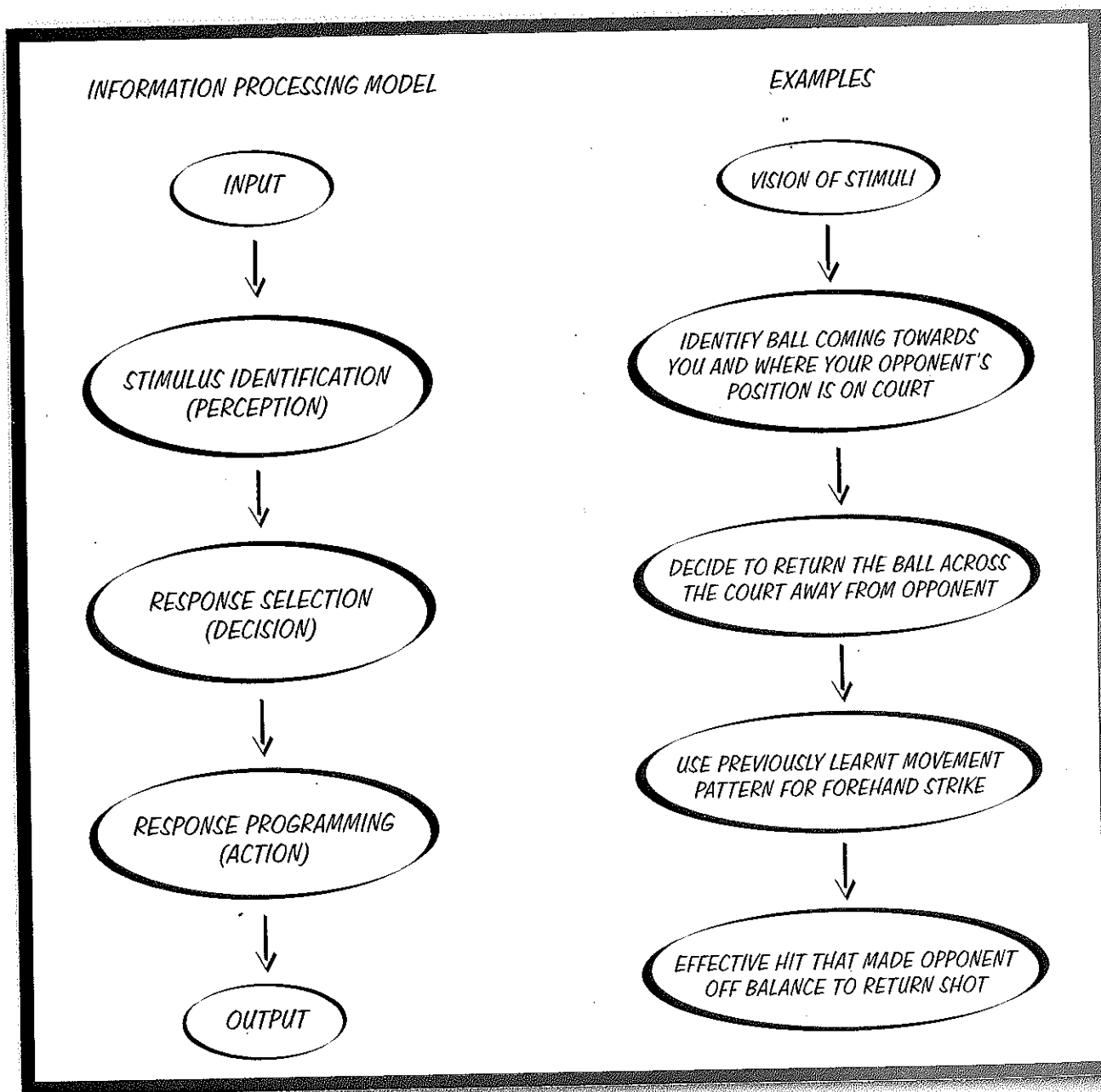
1 Information-processing models

In sport, correct technical execution of motor skills is important for effective performance, but the decisions that players make are also crucial and often determine the outcome of games. This is especially the case in more complex games, in which players are not only required to perform technical skills, but also constantly having to make decisions. Players who pick up important environmental information and make better decisions based on this information are often the ones who end up winning the contest. This is often most important in sports such as soccer, football and netball. Australian football players in possession of the ball, for example, are often presented with options as to what action to take, such as kick the ball long, kick it short, handball to a close team-mate, run with the ball or kick at goal.

One model of how decisions are made and actions are carried out in sport is the information-processing model. This model is closely aligned with motor program-based views of motor control discussed next. Information-processing views liken people to computers, with input entering into processing and going through several stages before an output is produced. The predominant model of information processing in motor behaviour suggests that there are three information-processing stages between input and output

(Schmidt & Lee 2005). Input refers to the information received from the senses for processing (such as seeing a red object in peripheral vision). In stimulus identification, the input is recognised and identified (identifying that the red object is a team-mate). In response selection, a decision about

what response to make is made (deciding whether to pass the ball to the team-mate). In response programming, the motor system is organised to produce the movement (using a pre-determined motor pattern, for example, passing the ball). Output is the response that is produced (an effective pass to a team-mate).



The information-processing model in game sense.

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Game sense approaches enable instructors to modify games to manipulate the amount of information to process, so that learners are not overwhelmed in their decision making (processes). But it can also enable simpler perception of relevant cues and selection of appropriate responses in addition to the programming of actions (for example, 2v1). That is, game sense can enable learners to experience all three stages of information-processing required in sport. Learners practise picking up important cues from the environment, select appropriate responses, then program an appropriate movement response to finally execute that response. Traditional instructional approaches focus on skill execution, with little practise of the perceptual and decision making components. By practising skills in structured game situations, participants will develop their decision making (i.e. when and where to run or pass). Such game skills can become automatic (subconscious level) quite quickly and, therefore, enable more attention and time for executing technical skills.

2 Motor program theories

Motor program based theories give prominence to central commands that are stored in memory, that is, a motor program (Magill 2011). This motor program is stored in long-term memory (LTM) and is recalled to execute a skill, which suggests that there is some sort of command centre that sends out the commands for action (Coker 2010). A motor program can be thought of as a movement plan that contains all the commands needed to carry out the intended action. Schmidt (1988, 2003; Schmidt & Lee 2005) has developed the generalised

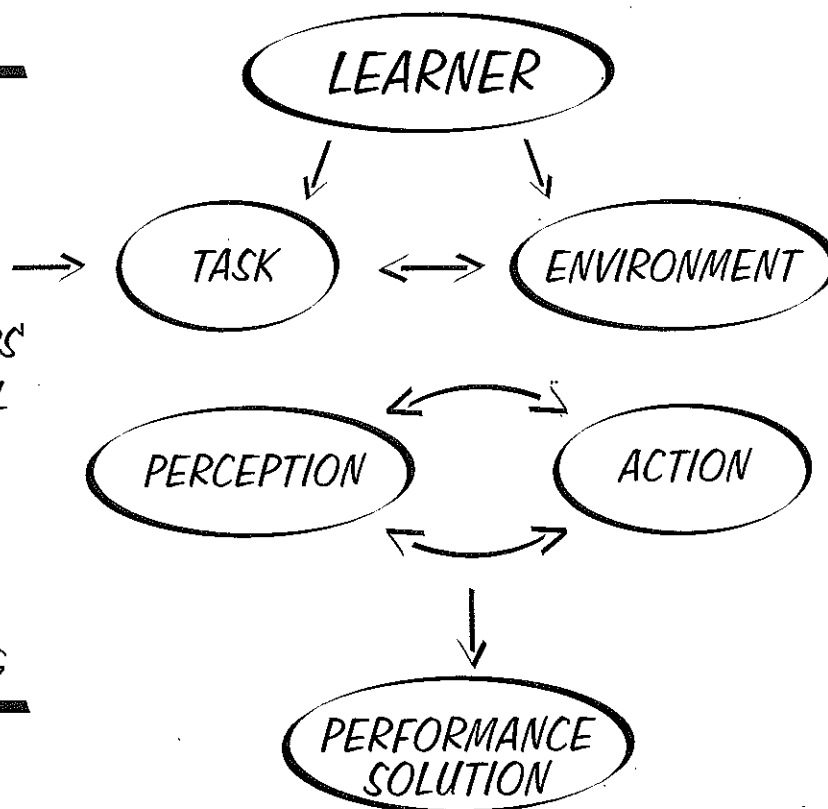
motor program view (GMP), probably the most popular view of how a motor program operates to control movement. Schmidt proposed that rather than storing a specific program for each specific movement produced, a generalised motor program is stored that defines a pattern of movement rather than a specific movement (Schmidt & Wrisberg 2008). That is, rather than storing a program for each type of kick that is needed to be produced in a game, a general kicking program is stored that is then modified to the specific situation. There are certain components of the movement that cannot be modified (called invariant features) and there are components that can be modified (called parameters of movement). These parameters can be modified to produce variations in the movement pattern to adapt to the situation. A schema is a set of rules that is used to modify the parameters of the GMP (Schmidt 1975, 1988, 2003). An advantage of practising variations of a skill in a realistic setting, such as that provided by game sense, is that it enables learners to develop competence in modifying the parameters of the action, such as working out how hard to kick a ball for an effective pass to a team-mate, rather than kicking a specified distance set up by the teacher or coach. Thus, by playing the game, players come to understand the relationship between their actions and the environment and can become better at programming those actions, rather than producing one movement pattern that they have difficulty in adapting.

3 Dynamic systems theories and the constraints-led approach

Dynamic systems theories of motor control (sometimes called ecological, dynamic pattern,

*IN GAME SENSE
APPROACHES,
WE MODIFY TASK
CONSTRAINTS TO:*

- *MATCH LEARNERS'
DEVELOPMENTAL
LEVEL*
- *CHALLENGE
LEARNERS TO
DEVELOP
UNDERSTANDING*



The interaction of learner, task and environmental constraints in dynamic systems view of movement applied to game sense.

or action systems theories) suggest that movement solutions emerge or self-organise as a function of the dynamic interaction between the learner, environment and task constraints.

Constraints are the boundaries that have a bearing on movement capabilities (Clark 1995; Newell 1986) and consist of all factors in the learning environment that influence learning and performance (Araujo, Davids, Bennett, Button & Chapman 2004; Coker 2010). Constraints are not necessarily limiting factors (even though the term seems to imply this). For example, being tall is a learner constraint in movement – but provides advantages in

rebounding in basketball and may influence tactics used by a player for advantage. Environmental constraints include physical environmental factors (for example, gravity, temperature, wind) and social environmental constraints (for example, spectators or peers or teachers watching, cultural norms). Differences in learner constraints will have implications for how teachers and coaches will structure learning tasks and games (Rink 2010). Task constraints include the aim (for example, the outcome of the action, such as getting the ball in the goal), rules (for example, off-side, contact, number of passes, goal size, number of players) and equipment (for example, court

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size, racquet or bat, ball size). These are the most readily available for manipulation by the teacher or coach and modifications to them can shape the emergence of behaviours by learners (Renshaw, Chow, Davids & Hammond 2010). This applies especially to game sense, where making modifications to constraints such as court size, equipment used and rules of the game can create different challenges for learners to overcome and encourage different movement solutions.

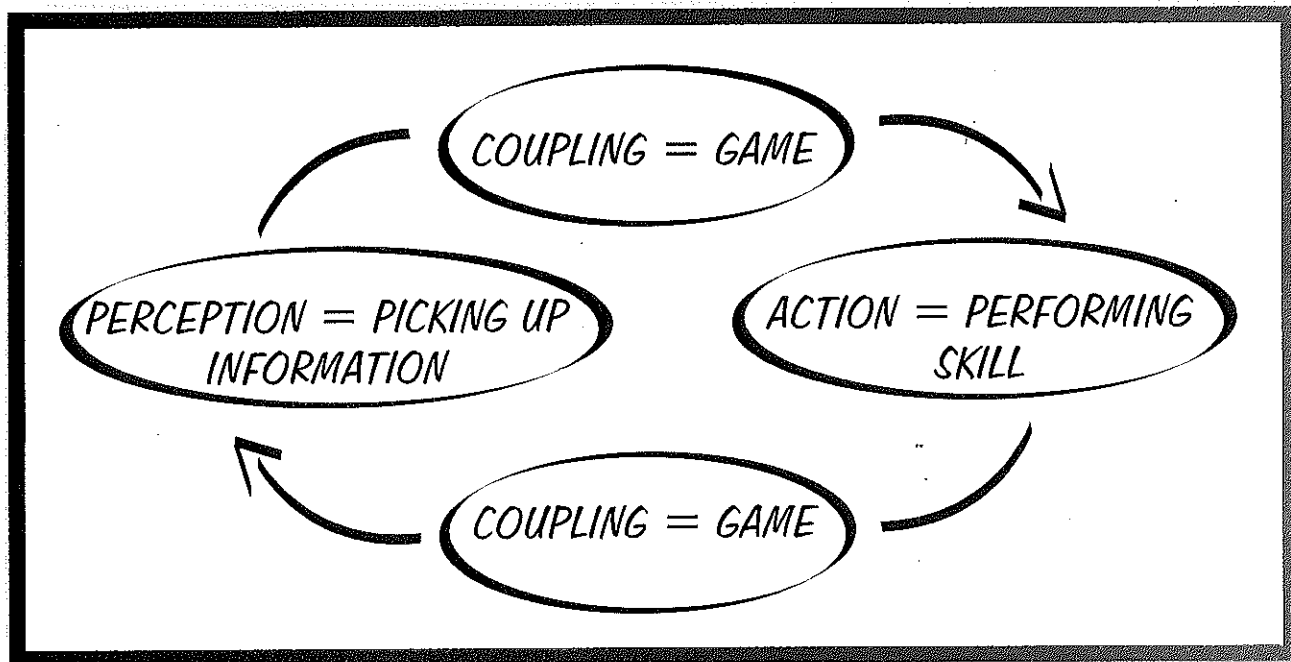
As part of this theoretical understanding of motor control, a constraints-led approach to understanding skill acquisition has emerged that focuses on how these interacting

constraints shape movement skill acquisition and game play knowledge (Araujo, Davids, Bennett, Button & Chapman 2004; Davids, Button & Bennett 2008; Renshaw, Chow, Davids & Hammond 2010). In this approach, the learner searches movement possibilities for a movement strategy to solve the imposed constraints (for example, Davids, Araujo & Shuttleworth 2005; Davids, Button & Bennett 2008; Newell 1991). The movement solution will vary according to the constraints in the situation.

As constraints are constantly changing, movement solutions change (Davids 2010). Thus, changing constraints, such as changing

Table 1.2 Examples of constraints in game sense

LEARNER CONSTRAINT	ENVIRONMENT CONSTRAINT	TASK CONSTRAINT
A person's biological and functional characteristics	Physical and social environmental factors	The task being performed includes the aim, rules and equipment
Examples	Examples	Examples
Height	Court surface	Maintaining possession
Weight	Gravity	Getting the ball in the goal
Strength	Temperature	Score more than the opposition
Power	Wind	Hitting into space
Endurance	Rain	Score as many runs as possible
Flexibility	Amount of light	Number of steps allowed with the ball
Fitness	Humidity	Off-side rules
Motivation	Background noise	Contact rules
Confidence	Gym or field	Number of passes allowed
Anxiety	Motivational climate of class	Goal size
Perceptual and decision making skills	Spectators	Number of players
Technical skills	Peers watching	Ball size
Tactical knowledge and strategic skills	Teachers watching	Hitting implement (racquet or bat)
Experience	Cultural norms	Court/field size



Perception action coupling in game sense.

task constraints in a game sense approach, may cause new movement solutions to be achieved. The game sense approach in this book outlines games that provide opportunities for teachers and coaches to manipulate key constraints to assist learners in exploring functional movement solutions.

The constraints-led perspective then views the learner as an active problem solver and emphasises discovery learning (Coker 2010). The instructor is seen as a facilitator who identifies and manipulates constraints to guide the learner in searching for movement solutions (Williams & Hodges 2005). Tactical learning approaches (such as game sense) provide an ideal opportunity to manipulate key constraints (Chow, Davids, Button, Renshaw, Shuttleworth & Uehara 2009) and in game sense, this typically involves the manipulation

of task constraints to enable progression in tactical development (Chow, Davids, Button, Shuttleworth, Renshaw & Araujo 2007). In discovery learning, the instructor develops a learning environment where learners attempt to solve movement problems by exploring a range of possible solutions (Coker 2010). The role of the teacher or coach is then to identify and manipulate the key constraints to facilitate the emergence of solutions to the movement problems (Chow, Davids, Button, Shuttleworth, Renshaw & Araujo 2006; Renshaw, Chow, Davids & Hammond 2010). Game sense applies very well to this conception of the learner as an active problem solver and the instructor as a facilitator, with challenges presented to students through the manipulation of task constraints which leads to learners developing movement solutions to the challenges presented.

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Another key feature of the constraints-led perspective is the emphasis on the importance of perception–action coupling, which suggests that learning environments should couple key sources of information with movement (Davids 2010; Renshaw, Chow, Davids & Hammond 2010). A key aim of games teaching should be for learners to become more attuned to important environmental information in performing skills (Chow, Davids, Button, Shuttleworth, Renshaw & Araujo 2007). As a consequence, technical skills should not be practised in isolation from the perceptual environment in which they will be performed. Game sense can be a useful approach to teaching and coaching by practising technical skills coupled with the decision making and strategic elements of a game. This supports the notion of providing representative tasks in the learning environment in order to enable learners to become attuned to important environmental information (Gorman 2010). Game sense approaches enable learners to practise with key information sources present, which allows perception–action coupling. Davids (2010) advocates that task simplification (where links are maintained between action and perception) should be considered in instructional design, rather than breaking technical skills down to practice in isolation from the context in which they are performed. The game sense approach seems aligned with such a perspective by modifying games to create challenging situations that are representative of a games category and/or the full version of a game.

Also incorporated in a dynamic systems view of movement control and the dynamic interaction between the learner, task and

environment is the idea of affordances. Affordances are opportunities for action provided by the environment or task in relation to the performer's capabilities (Burton 1987; Gibson 1977, 1979). This means that the environment is perceived by the performer in relation to the actions that they can use (Burton 1987). If, for example, you were playing tennis and you saw your opponent on one side of the court, you would perceive an affordance for a shot to the other side. You may only have perceived this affordance because of your own positioning on the court. This has a clear implication for teaching and coaching – that learners should be placed in learning environments where the environmental conditions provide opportunities to search for affordances. By situating learning in a game environment, the game sense model in this book can provide for these opportunities.

Motor learning principles

Motor learning involves the study of how we learn, acquire and refine movement skills and this includes the study of variables that influence this skill acquisition. Some key motor learning principles that are related to our understanding of the potential benefits of game sense and tactical learning approaches include:

- 1 implicit and explicit learning
- 2 focus of attention and action–effect hypothesis
- 3 practise variability
- 4 transfer of learning
- 5 practise specificity
- 6 feedback and questioning.

1 Implicit and explicit learning

There are two key types of learning: implicit and explicit. There is growing evidence from exploration of the role of explicit and implicit learning processes in skill acquisition that seems to support that the use of explicit instruction may not be the most effective learning approach. Explicit learning takes place when skills are learnt through direct instruction on how to perform a task. In explicit learning, the learner is clearly aware of learning that particular skill. Explicit learning is often associated with traditional teaching and coaching approaches where verbal instruction on specific technical skills is used. Implicit learning takes place when skills are learnt through undertaking practice tasks, but without direct instruction on how to complete those tasks. Implicit learning approaches generally involve coaches or teachers facilitating or guiding players to explore options, through techniques such as questioning. In implicit learning, learners often learn subconsciously by experiencing certain situations and learning from mistakes. It appears that more implicit learning processes more effectively translate into performance than explicit methods of instruction (for example, through structured isolated skill drills). In addition, implicitly learnt skills appear less likely to 'break down' under fatigue, stress or pressure (Wulf 2007).

Traditional approaches to teaching and coaching are often characterised by high levels of explicit instruction and augmented feedback (Williams & Hodges 2005), usually focused on technical skills. Skill performance, however, is often performed through subconscious control and, in fact, high level

execution of skills often appears automatic. Explicit instructions and augmented feedback may encourage learners by focusing on movement performance and more conscious control of movement, leading to performance decrement as they switch from automatic to more controlled processing. Instruction and feedback may be better served to focus on the outcome of action rather than internal control processes (Wulf 2007). Skill practices should occur in a dynamic scenario, such as in representative constrained small games (Chow et al. 2009); for example, game sense approaches, which can help foster implicit learning of skills, rather than explicit drills and instructions. The use of questioning and guided discovery in the game sense approach advocated in this book may assist teachers and coaches in focusing on intrinsic learning processes, as opposed to explicit instruction. Challenging learners to explore in a game-based practice situation is one way of encouraging an implicit learning process. Game sense can help implicitly challenge the learner to understand what to do and how to do it.

TWO KEY TYPES OF LEARNING:

- Implicit learning takes place when you learn skills through practice tasks without direct instruction on how to complete those tasks.
- Explicit learning takes place when you learn skills through direct verbal instruction on how to perform a task.

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2 Focus of attention and the action-effect hypothesis

Closely related to the ideas around implicit and explicit learning is understanding the influence of focus of attention on learning and performance. A number of researchers have suggested that the focus of attention of the learner is important in skill learning and that instructions provided to learners can influence their focus. Wulf (2007) argued that an external focus of attention, such as attending to the effects of the action, is more beneficial to learning a movement skill than an internal focus of attention, such as attending to the movement itself. It is believed that this effect occurs because an internal focus can disrupt automatic motor control processes. An external focus enables automatic processes to control performance (Wulf 2007). In traditional approaches to instruction, learners are instructed to focus on their movement technique (as in explicit instruction), which may encourage an internal focus. Game sense, on the other hand, encourages learners to focus on the solution or the effects of their actions, which appears to tend more towards an external focus.

3 Practice variability

Practice variability refers to the variety of movement and context characteristics experienced when practising a skill (Magill 2011). Two different schedules of practice have been identified in the motor learning literature: blocked practice (or constant practice) and random practice (or variable practice). In blocked practice the learner repeatedly rehearses the same task (Schmidt & Wrisberg 2008). In random practice the learner

performs a number of different tasks in no particular order, thus avoiding or minimising consecutive repetitions of any single task (Schmidt & Wrisberg 2008). (Variable practice refers to practising a number of variations of the same task in no particular order, such as hitting a forehand from different court locations).

Most research on blocked/constant and random/variable practice has suggested that random/variable practice results in worse performance during practice than blocked/constant practice but better performance than blocked/constant practice in retention or transfer tests. That is, there is a learning benefit of practice variability in the long term. One of the reasons for this is that performance errors during practice may be important for the learning process. This effect, where there is a learning benefit of practice variability, is called the contextual interference effect. Contextual interference results from the disruption or interference that occurs between practice attempts of the skill (that is, the learner has done something else before practising the skill again). The contextual interference effect appears to translate to the learning of most skills and in most settings. There are two main hypotheses that have been put forward to explain the contextual interference effect:

- 1 The elaboration hypothesis (Shea & Morgan 1979; Shea & Zimmy 1983) proposes that we build more elaborate memories by changing tasks or practising several variations of the task.
- 2 The action plan reconstruction hypothesis (Lee & Magill 1985) suggests that by changing the task (i.e. creating

interference), the learner forgets what had to be done and this requires an action plan be created. This is likely to lead to more active problem solving and, as a consequence, better learning.

Contextual interference effect: the advantage of random/variable practice over blocked/constant practice for retention of skill learning.

Traditional teaching and coaching approaches with structured drills and repetition of the same movement pattern often tend to reflect a more blocked/constant practice approach to learning. In contrast, because skills are practised in a game, game sense approaches tend to provide more variability in practice with less repetition of exactly the same movement skill. The limitation of more variable approaches, such as game sense, however, is often considered to be a reduction in the number of repetitions of the skill (i.e. the skill is not practised as often in a session as it is in a traditional model), so the amount of practice of each technical skill might be reduced.

Variability is also an important component of dynamic systems and constraints-led views of skill learning, as far back to the definition of effective practice provided by Bernstein (1967) as being 'repetition without repetition'. The dynamic systems and constraints-led approach suggest that movement variability provides functional flexibility to adapt to the dynamic movement environments that occur in games. Movement variability assists in movement adaptation and also enables learners to compensate for learner constraints, such as

their developmental level to reach solutions. Game sense approaches allow learners opportunities to explore and solve problems. This solving and exploring creates variability in learning in comparison to traditional skill drill approaches, which helps to create more flexible and adaptive players (Chow et al. 2009).

4 Transfer of learning

Transfer of learning refers to the influence of previous experience on the learning of a new skill or of performing a skill in a new context. To maximise transfer, theories suggest that there should be high levels of similarity between the practice and performance environments in terms of skill components or context (identical elements theory; Thorndike 1914) and cognitive processes, (transfer-appropriate processing theory; Lee 1988) and that practice activities should be representative of task demands (dynamical or constraints-led perspective) (Chow et al. 2009). Transfer is at the basis of tactical learning and game sense approaches to instruction, with the emphasis on transfer across games within a category, for example, invasion, net/wall and striking/fielding. The game sense approach outlined in this book encourages learners to explore similarities between games; this thematic approach emphasising transfer across games is described in more detail in Chapter 3.

5 Practice specificity

The specificity of practice hypothesis proposes that the best practice conditions are those that are as close as possible to the target skill and target context (Schmidt & Wrisberg 2008). Practising technical skills in isolated drills

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does not appear to adequately replicate the situation in which the skills will be performed (i.e. the game). By practising in a game-based environment, specificity of learning is increased in game sense approaches, in comparison to traditional technical skill models of instruction.

6 Feedback and questioning

Feedback is considered to be an important learning variable in both the physical education teaching and motor learning literature. Providing appropriate feedback is often seen as important to good teaching practice, so that it is common to supply people learning a skill some form of feedback about their performance (Magill 1994). Feedback is also often a prescribed part of teacher education and evaluation (Silverman, Woods & Subramaniam 1998). In physical education, the term 'teacher feedback' is often used to describe this type of teacher behaviour (Lee, Keh & Magill 1993), whereas in motor learning, feedback provided by an external source, such as a teacher or coach, is referred to as augmented feedback (Magill 2011).

Although it is considered to be an important variable in learning, findings on the relationship between the amount of feedback provided and student performance in physical education have been mixed (see Lee, Keh & Magill 1993; Rink 2002; Silverman 1994). In motor learning, feedback is considered important; however, the feedback frequency that produces the greatest learning varies (Magill 2011). Early theorists and researchers considered that based on theories such as the law of effect, higher frequencies were better

for learning (Thorndike 1931); yet, more recent findings suggest that the optimal feedback frequency is certainly not on every practice attempt of a skill. In physical education the literature also often assumed that more was better (Silverman 1994). However, it now appears that providing feedback less frequently encourages the learner to engage in a more active learning process and, perhaps, use more beneficial learning strategies (Salmoni, Schmidt & Walter 1984; Winstein & Schmidt 1990).

Effective questioning strategies are crucial to the teacher's role. Effective questioning can facilitate guided-discovery learning (Hubball, Lambert & Hayes 2007) and is also crucial to teacher intervention to assist students in their learning. The provision of augmented feedback through questioning in game sense encourages less frequent feedback provision, but feedback that directs attention to external goals of movement solutions, rather than explicit instruction on technique.

Another potential advantage of game sense is that because students are quickly involved in game play, game sense has the potential to reduce management issues for the instructor (Lauder & Piltz 2006). This enables teachers or coaches to provide feedback and encouragement and also to develop questions for students to encourage thinking about the problems presented and the possible solutions.

Pedagogical principles

Pedagogy is the art and science of teaching and learning and the instructional strategies used to induce learning. It relates to our understanding of teaching and learning in physical education. There are a number of pedagogical principles that relate to the game sense model outlined in this book, which include:

- 1 constructivist learning theories
- 2 students motivation
- 3 motivation and confidence of teachers.

1 Constructivist learning theories

Teaching and coaching involves a range of decisions about how we will go about creating a learning environment for a particular topic or subject matter. These decisions are often based upon our assumptions or understandings of how people learn. Theories of teaching and learning pedagogy which have evolved over the years, appear to have moved from teacher-centred to more student-centred approaches (Richard & Wallian 2005), with constructivist approaches to learning and teaching becoming a dominant paradigm in teacher education programs (Fox 2001).

Constructivism is a theory of learning based on the premise that we create new understandings based on the interaction of our prior experiences and knowledge. Active engagement of the learner is a central assumption of constructivist learning frameworks (Kirk & MacPhail 2002), so that rather than simply receiving transmitted information and internalising it, information is actively appropriated; this new knowledge is adapted to fit with existing knowledge

(Kirk & MacPhail 2002). A basic premise of constructivist theories in education is the process of developing autonomous learners through their own understanding of knowledge and skills (Richard & Wallian 2005).

In constructivist approaches, instructors guide the learners to deeper and more complex understandings, taking on the role of facilitator and creating problems designed to challenge students to develop responses to the problems posed. The teacher's goal is to understand the needs of the learner and provide learning experiences to help the student gain a better understanding. The game sense approach provided in this book aims to provide such an approach to assist the teacher or coach in facilitating such a learning framework.

IN CONSTRUCTIVIST FRAMEWORKS

- knowledge is actively constructed by the learner, not passively received from the environment
- understanding is a process of adaptation that is constantly being modified by a learner's experience
- educators facilitate this process.

According to a constructivist conception of learning in physical education, students begin the learning experience with previous experiences and can be encouraged to engage with the content using this previous experience to explore and interact with new knowledge to develop a more complex understanding (Singleton 2009). Questioning

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is vital to assist in linking prior knowledge with new scenarios or experiences. As a consequence, physical education involves engaging students in active knowledge production, rather than transmission of information to students to memorise. This is in contrast to traditional approaches, which largely rely on transmission of information to passive recipients.

PEDAGOGICAL IMPLICATIONS OF UTILISING A CONSTRUCTIVIST APPROACH:

- the teacher is a facilitator
- students are active learners
- students work in groups and/or modified games
- learning activities are interesting and challenging
- students are held accountable (Dyson, Griffin & Hastie 2004).

The tactical learning model and game sense approaches contain many of the attributes of constructivism (Metzler 2005) and are consistent with the constructivist notions of knowledge creation, since it emphasises active learning, decision making, understanding and modification of games to match the developmental level of the learner (Kirk & MacDonald 1998). The tactical problems presented in game forms and the emphasis on tactical understanding (why) before technical skill execution (how) suggests a constructivist learning theory approach (Metzler 2005).

CONSTRUCTIVISM IS CHARACTERISED BY

- questioning
- feedback
- implicit learning
- transfer.

In game sense, learners solve the problems or challenges presented to them in games by utilising their previous experience, which enables them to construct new meanings (Singleton 2009). By presenting challenges for students to solve, modifying games to introduce more challenging situations and questioning, the teacher or coach is able to help students explore possible solutions and use their prior knowledge to develop new knowledge (Butler, Oslin, Mitchell & Griffin 2008). The use of games categories and emphasis on transfer of knowledge across games emphasises this learning approach, where students are challenged to use their existing knowledge from a previous game activity or sport and link it with new understandings and experiences as they confront new challenges in a game. For example, in invasion games students first experience concepts of creating and denying space in two versus one (2v1) games. This knowledge and experience is then brought with them to exploring these concepts in more complex game forms such as end zone or rebound ball, where there is more complex perceptual information. Experience in a variety of modified game forms that highlight specific concepts, assist students to apply tactical understandings in increasingly complex ways in a range of situations (Singleton 2009).

2 Students' motivation

One of the potential benefits of game sense is the opportunity for learners to experience positive motivational states (Mandigo & Holt 2004). As outlined earlier, students want to play games – games are fun and exciting (more fun than repetitive drills). This can create a more positive learning environment. In addition, because game sense is a student-centred approach where learners are provided with opportunities to explore solutions, it provides for an increased sense of autonomy in learning. Theories of intrinsic motivation, such as self-determination theory (Deci & Ryan 1985), propose that we have an innate desire to feel competent and self-determining, and experiences that provide for this are likely to increase intrinsic motivation. By providing learners with opportunities to explore and try ideas, teachers and coaches can provide a sense of autonomy, which is likely to enhance intrinsic motivation (Mandigo & Holt 2004). In fact, in designing early ideas around teaching for understanding, Thorpe (1992) argued that one of the limitations of traditional models of games instruction was that the emphasis on developing better technical skills subjugated the intrinsic motivation of students to play the game. By playing the game students will recognise the interest and enjoyment of playing games (Bunker & Thorpe 1986).

3 Motivation and confidence of teachers

There is a relatively short amount of time devoted to training generalist primary teachers in physical education in Australia (Peters & Schuck 2009). As a consequence, these teachers may lack confidence in and motivation towards teaching physical

education content, which may impact upon student learning outcomes and engagement in physical education (Callea, Spittle, O'Meara & Casey 2008). The similarity between game sense and constructivist approaches to classroom teaching may assist primary school teachers to develop confidence and motivation to teach physical education, despite a lack of sport-specific knowledge (Light & Georgakis 2007). By providing an alternative to traditional directive technical skill-focused approaches, the student-centred approach of game sense might offer a means through which primary school teachers increase in confidence to teach physical education and increase an understanding of how physical education can contribute to the development of their students. As game sense approaches are connected to constructivist theories of learning that are common in teaching in most other subject areas in primary school (Kirk & MacDonald 1998), teachers can understand the approach and connections with other discipline areas. Teachers who are self-determined (intrinsically motivated in their teaching) are more likely to support students' autonomy and this, in turn, leads to greater intrinsic motivation among students (Spittle, Jackson & Casey 2009). A potential advantage of a game sense approach over traditional models in this area is the reduced emphasis on technical skill instruction and knowledge that many primary generalist teachers may feel that they don't possess. Game sense may be an appropriate approach to encourage these teachers towards physical education curriculum, based on the notion that game sense does not require a mastery of a large range of content (Peters & Schuck 2009).

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LEARNING OUTCOMES FROM USING GAME SENSE

Based on the previous explanations of why game sense is effective, a number of learning outcomes have been advocated. In fact, because the game sense approach to teaching and coaching is student-centred and adopts a constructivist approach to teaching and learning, it can be used to foster a range of behavioural, social, cognitive and affective learning outcomes (Mandigo & Corlett 2010; Mitchell 2005). The game sense approach emphasises the development of an understanding of games, so that rather than being literate in one game, students who are games literate can engage in a range of games. Several authors have described how a game sense approach can foster games or physical literacy (Mandigo & Holt 2004; Mandigo & Corlett 2010), through games designed to enhance decision making and tactical and technical skill development in a motivational setting (Oslin & Mitchell 2005). Thus, it would be expected to produce cognitive learning outcomes as well as affective learning outcomes. Game sense models are based on the assumption that students progress from tactical understanding to technical skills, or from why to how (Thorpe 1992). This suggests that cognitive learning outcomes are important, as well as technical skill development (Metzler 2005). In this section, skills, knowledge and values and behaviours as learning outcomes from adopting a game sense approach will be discussed.

GAMES LITERACY RELATES TO WHEN STUDENTS

- a have knowledge and understanding to anticipate patterns of play
- b can use appropriate responses based on their technical and tactical skills
- c can experience positive affective states while helping others also experience positive affective states in a game (Mandigo & Corlett 2010; Mandigo & Holt 2004).

Table 1.3 outlines the three broad categories of learning outcomes that can be utilised in developing specific learning outcomes for the game sense activities, lessons and units presented in this book.

Table 1.4 outlines examples of how skills, knowledge, and values and behaviours can be related to invasion (court) games unit for beginning to intermediate level (see Chapter 8).

Skill and knowledge learning outcomes

Game sense approaches can be used to develop knowledge, appreciation and understanding of games. This includes knowledge and understanding of rules, tactics, decisions and also skill execution. By focusing on the game rather than technical skills in isolation, students can begin to understand the game and its rules, tactics and decisions to be made, as well as appreciate the technical skills to be used. They may also be able to understand and apply this knowledge and understanding across games by recognising

Table 1.3 The three broad categories of learning outcomes

LEARNING OUTCOMES	DESCRIPTION	EXAMPLES
Skills		
	Involves technical and tactical components and are usually performed under some level of pressure.	
Technical skills	Movement patterns or techniques to perform a task.	Accurately passing the ball; racquet follow-through on a tennis serve.
Tactical and perceptual skills	Game sense or thinking skills. Being able to utilise information to make decisions.	Utilising the lob in badminton when the opponent is close to the net; passing the ball to a team-mate who is in open space; throwing the ball to the home base in order to run out a player.
Knowledge		
	Includes having knowledge and utilising knowledge (thinking), such as comprehending, applying, analysing and evaluating.	
Declarative knowledge	Understanding basic rules and techniques and how they shape the game.	Explaining the off-side rule; understanding which skills transfer from baseball to cricket; describing how reducing the number of players in a game creates more space; describing how to throw a ball.
Contextual knowledge	Applying knowledge of rules and techniques/tactics to a variety of situations.	Identifying space on court to move into; selecting the best type of pass in a given situation.
Values and behaviours		
	The outcomes around values and behaviours include feelings, attitudes, values and behaviours -- it involves learning about and understanding oneself and others.	
Feelings	Affective states or emotions such as motivation and confidence.	Feeling that you can contribute successfully to team performance; wanting to play the game.
Attitudes	Beliefs and feelings about a behaviour or activity.	Enjoying team games for the social relationships they provide; liking an activity because a tactical solution that has been developed can be applied.
Values	Determining the importance of an action or event and placing it in relation to other values.	Understanding the need to follow rules; seeing the importance of physical activity; understanding ideas of equal opportunity and allowing everyone to be involved; valuing good sportsmanship.
Behaviours	Performing actions based on values, attitudes and feelings (doing).	Following game rules and etiquette; helping out team-mates with instruction and guidance; displaying sportsmanship in a game situation; accepting decisions.

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Table 1.4 Examples of how skills, knowledge, and values and behaviours can be related to invasion (court) games

LEARNING OUTCOMES	EXAMPLE
1 Skills - a Demonstrate attacking principles that apply to small-sided modified games, which includes the ability to identify space; keep possession of the ball and move the ball effectively to create scoring opportunities. - b Demonstrate the ability to select and perform appropriate techniques for given situations, which includes how to accurately pass the ball to team-mates. - c Demonstrate basic defensive principles that apply to small-sided team performance.	• Keeping possession of the ball when under pressure. (When to run or pass? Where to pass?) • Identifying space on court (Where to run/move), for example, moving defenders, giving ball carrier a clear option. • Selecting the best type of pass in a given situation, for example, bounce or lob? How to pass the ball effectively? • Effective passing, receiving, dribbling and shooting execution. • Work out (implicitly) the most effective ways to defend, for example, in dangerous space, moving to a goal-side position.
2 Knowledge - a Demonstrate an understanding of basic rules and techniques and how they shape a game, for example, area, number of players, rules. - b Demonstrate an understanding of how different games are tactically similar and the transfer of tactics and techniques across games. - c Demonstrate contextual knowledge, for example, ability to apply rules and techniques to a variety of situations.	• How to throw, catch, dribble or shoot the ball in the game context. • How tactics should alter with a change in court space or rules. • What netball and basketball strategies are similar? • What skills transfer between netball and basketball? • How rules shape a game and its tactics. • How modifying rules and game variables will alter the tactics required in order to be successful.
3 Values and behaviours - a Demonstrate teamwork (working successfully with peers). - b Demonstrate sportsmanship (fair play). - c Demonstrate leadership skills through team play. - d Demonstrate enjoyment and fun.	• Including all team members in play and assisting each other. • Fair play characteristics (see appendices), for example, accepting decisions. • Helping out team members with instruction or guidance.

the tactical similarities (Mandigo & Holt 2004). In addition, because the performance of skills is placed within the context of a game students may understand how to employ appropriate responses in game situations (Mandigo & Holt 2004). Apart from understanding the importance of technical skills and why they are used, the learning of how to perform them can also be enhanced in game sense approaches. The development of technical

skills is important for sports participation. This can occur through game sense and other methods (for example, fundamental movement skills programs in early development stages to develop movement pattern blueprints). Game sense does not suggest that technical skills should not be focused on, rather, that learners focus on these once they recognise their importance to the game.

- **Knowledge:** cognitive processes.
- **Skills:** physical processes (utilising the cognitive information).

One of the advantages of technical skill learning in game sense approaches over traditional models is that the skills are being learnt in situations in which they will be performed, not isolated from the game context. This may mean that they are more likely to transfer to the game situation and also less likely to break down under the pressure of a game. To take a fundamental motor skill such as throwing or kicking and teaching it in isolation using drills until it is mastered seems like a reductionist approach, while ignoring important contextual aspects of the skill (O'Connor 2006). This is consistent with dynamic systems views of skill learning where the emphasis is on developing functional actions (Chow et al. 2009). Functional movement patterns can differ between individuals because movement problems can be solved in different ways, so that there is no one correct technique for everyone; that is, there is movement variability, and game sense approaches can allow different self-adjusted goal-directed movement behaviours to emerge during learning (Chow & et al. 2009), which may be optimal for that individual given their constraints and the constraints of the task and environment. The dynamic systems and constraints-led approach suggests that movement variability allows for functional flexibility of movement patterns to be developed so that learners can develop effective approaches for themselves matched to the movement situation.

The knowledge, understanding and skill outcomes that students can achieve from tactical approaches include four categories:

- 1 declarative knowledge (learning the rules, tactics and techniques)
- 2 contextual knowledge (application of the rules, tactics and techniques)
- 3 technical skill (execution of a technique in a game)
- 4 tactical skill (decision making, for example, when and where to pass, when or where to run?).

Particularly from a coaching perspective, as learning is situated within a game context, game sense can be used to:

- 1 develop a player's decision making ability (reading game and player cues)
- 2 improve a player's ability to execute a skill under game pressure
- 3 develop particular team plays and strategies (in-focus skills)
- 4 develop functional actions for that individual player.

Values and behaviours learning outcomes

How often have you heard students ask 'When can we play a game?' or 'What are we playing today?' or 'Are we going to play a game today?' in physical education classes? Students find game play exciting and motivating. This can be taken advantage of in game sense by situating learning within a game to enhance motivation of learners. Rather than having students engage in repetitive skill drills, during which they have difficulty seeing the purpose of the skills being practised, students can be engaged

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Table 1.5 Skill learning outcomes related to game sense

LEARNING OUTCOMES – SKILLS	HOW GAME SENSE CAN ACHIEVE OUTCOMES	EXAMPLES
1 Declarative knowledge (of rules and techniques).	- Games that emphasise how rules shape a game. - Games that demonstrate which techniques are most effective.	- Making the area smaller; adding 3-second rule. - Questioning: Is a lob pass effective?
2 Contextual knowledge (understanding tactics; and similarities between different games).	- Use of questioning to reinforce learning. - Presenting games in categories to demonstrate tactical transfer between games.	- When should you pass the ball? - Invasion (court) games, for example, netball, basketball, team handball (similar tactics).
3 Tactical and decision making skill.	Games that use structured scenarios to emphasise problem solving.	2v1 – 2 attackers must run the ball over the end line.
4 Technical skill (execution of a skill in the game context).	Games and questioning to demonstrate and develop particular techniques.	Must use bounce pass: Was this more effective than a lob pass?

in game-based activities where they come to understand and appreciate tactics and the need for technical skill development. In fact, positive, affective and motivational experiences were key considerations in the development of games for understanding approaches. Thorpe (1992) argued that one of the limitations of traditional technical models of games instruction was that the intrinsic motivation of students to play the game was subjugated to the emphasis on developing better technical skills. By shifting the emphasis to tactical learning, students will recognise the interest and enjoyment of playing games (Bunker & Thorpe 1986). Learning outcomes for physical education should not only be on developing performance but also on improving motivation to participate in and enjoy games (Holt et al. 2002). These experiences should promote more complete learning of and motivation towards playing games (Kirk 2005).

A basis of game sense approaches is a belief that a shift to tactical understanding explored within games will help students recognise that games can be interesting and enjoyable (Bunker & Thorpe 1986). The more authentic and meaningful experiences of performing in game situations promotes more complete learning and motivation towards games (Kirk 2005). Therefore, there is an expectation that the learning environment created through a game sense approach will encourage positive affective outcomes, such as motivation and enjoyment. Thorpe (1992) suggested a number of potential affective learning outcomes from games for understanding approaches; these were classed as intrinsic motivation and incentives for playing games. Intrinsic motivation is a psychological construct that refer to participating in an activity for its own sake. Students appear to enjoy playing games and are motivated to do so. Most students

want to play the game, rather than spend time practising skills, commonly reporting games as being more fun than drills (Holt et al. 2002).

Developing an understanding of and appreciation for games is also likely to assist in developing participants who will continue to enjoy and engage in game play in the future, as well as participate in other games. One of the goals of tactical approaches to games is that of appreciation for and of the game. Participants will embrace the values of the game and sport and establish a positive attitude towards that sport and other sports, which may help promote a physically active lifestyle (Pope 2005; Siedentop 1996). Given the constraints on time in physical education, it may be better to help students appreciate the nature of games to foster a love and understanding of them (O'Connor 2006), rather than spending significant amounts of time trying to refine technical skills, which may not be able to be mastered by all students in a group of ranging ability levels.

Incentives for playing games include affiliation, achievement, sensation and self-direction. Affiliation relates to social involvement and a feeling of belonging to a social group, which includes social interaction, social reassurance and making friends. Game sense can develop feelings of affiliation because it involves team play and solving strategic problems presented to players as a group or team. In addition, skills (technical and tactical) are practised in the game as part of a group activity. Players come to recognise that they can and need to contribute to their team-mates (and rely on them) in solving strategic problems. The central focus is not on developing perfect

technique but on game play. Thus, it is possible to contribute to and experience success and even have a good game with less than optimal techniques (Thorpe 1992). Thorpe (1992) and Bunker and Thorpe (1986) suggested that by creating developmentally appropriate games that challenge students, success can be experienced by overcoming challenges, thus providing for a sense of achievement. Sensation includes experiencing the satisfaction of successfully creating space or successfully utilising a tactic to advantage, or the feeling of doing something well. This is more likely to occur when technical skill execution is not the primary focus for all students. Self-direction is encouraged because students are presented with problems to solve. Thus, students are encouraged to take some individual responsibility. An outcome of game sense approaches is to encourage active engagement with the activity, rather than be passive recipients of information (Kirk & MacPhail 2002). The aim is to develop players who recognise that, regardless of their ability level, they can play games and can learn in games.

Other potential learning outcomes and values of game sense approaches include teamwork and sportsmanship, since students are participating and working together to solve problems presented to them as groups or teams in the game-based activities. Students will often have to make decisions in small groups, which may lead them to develop skills such as listening, negotiating, discussing and compromising (Butler, Oslin, Mitchell & Griffin 2008). In addition, it may be used to foster leadership skills through team play and challenges. As students must cooperate

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INTRODUCTION TO TACTICAL LEARNING

with others and work with and against others, there is the potential for students to learn about sportmanship issues, such as equity and fairness. Creativity and questioning can be developed because students are constantly placed in situations requiring them to produce solutions (Butler, Oslin, Mitchell & Griffin 2008). Tactical learning approaches also have the potential to reduce management issues (Lauder & Piltz 2006), because the majority of students are quickly involved in playing a game, so the students are immediately engaged in the activity and are at the centre of the learning activity. The teacher then has more opportunity to teach rather than manage students in drills as there is more active involvement of the

group (and less boredom).

In adopting a game sense approach, students are encouraged to become players – to think, behave, feel and perform like players (Pope 2005). Such an approach should not be reduced to cognitive aspects of technical, tactical and decision making skills (Holt et al. 2002). As understanding and appreciating the game is central to these approaches, there is clearly an affective component and other values around game playing that can be fostered through such approaches.

Obviously, all of the learning outcomes are dependent upon the teacher or coach utilising the game sense model appropriately – the outcomes do not just happen on their own.

Table 1.6 Examples of values and behaviours learning outcomes in game sense

LEARNING OUTCOMES	HOW GAME SENSE CAN ACHIEVE OUTCOMES	EXAMPLES
Intrinsic motivation		
Enjoyment/fun	Playing a game rather than practising skills in drill format.	Playing gauntlet to focus on passing into space rather than passing in pairs.
Playing games for their own sake	Being immersed in the game activity and trying to solve problems presented.	The best strategy to score as many runs as possible in a game of three tee hit.
Continue to engage in game play	Wanting to play the game and willingly choosing to participate in games later.	Understanding that the game can be played effectively even without advanced technical skills and seeing a transfer of skill concepts across games.
Appreciation of the game	Appreciating how understanding can be applied in the games enables participants to participate in games at any level, embrace the values of the game and establish a positive attitude towards that sport and other sports.	Being successful at applying the tactical skill of hitting into space while playing hoop ball tee hit and appreciating how this skill can contribute to participation in other similar games.
Playing other games	Understanding how skills transfer and, when confronted with a new game, recognising how current skills can be applied to that game to encourage participation.	Having played hoop bounce and four square and recognising the need to hit the ball away from the opponent when first presented with long or short and even when confronted with the full game version of cricket.

LEARNING OUTCOMES	HOW GAME SENSE CAN ACHIEVE OUTCOMES	EXAMPLES
Incentives for playing games		
Affiliation	Working as part of a group or team to work out appropriate ways of solving the challenges and solving strategic problems presented to them.	Having 30 seconds to discuss defensive tactics as a group in a prison break, such as working as a team to quickly shift the defence around to deny the opposition space.
Achievement	Doing something well (or better) and experiencing the success of overcoming challenges.	Contributing to team performance in end zone by moving into position to deny the opposition space when in defence or moving the space to create passing options in attack.
Sensation	Satisfaction of successfully utilising a tactic to advantage or the feeling of doing something well.	The team successfully running out an opposition player in time to run through good fielding teamwork.
Self-direction	Taking responsibility for solving problems presented, rather than passive reception of information.	Working out an effective tactic following questioning by the coach, such as hitting the ball deep in the court to score against your opponent.
Teamwork and sportsmanship	Participating, supporting, working together and helping each other to solve problems.	Cooperating successfully in towel volleyball to devise an efficient technique to control the ball, and developing a tactic to cover as much space as possible when receiving.
Leadership skills	Helping to organise and assist others during team play and challenges.	Making decisions as a team as to batting order or field placements in rapid fire 2.



2

TACTICAL LEARNING IN TEACHING AND COACHING

TACTICAL LEARNING APPLIED TO COACHING

In coaching there has traditionally been a focus on movement performance and learning as knowledge transmission (Light & Robert 2010). However, contemporary thinking about learning (as discussed earlier in relation to teaching) can be applied to coaching to enhance the learning of participants (Light & Robert 2010). The learning outcomes mentioned in Chapter 1 apply to coaching as they do to teaching that is, coaching utilising game sense can assist coaches in developing a range of learning outcomes in their players, including outcomes related to knowledge, skills and values. This may assist coaches to develop more complete players than traditional approaches (which is important – rather than a narrow focus specifically on directly improving on-field performance).

Game sense has actually been more readily adopted in coaching than it has in teaching, with a significant impact upon coaching from grassroots to the elite level (Light 2004). For example, in Australia, game-based approaches have been adopted in Australian Sports Commission initiatives, such as the Active After Schools Communities (AASC) and Playing for Life programs (ASC 1999, 2005, 2010). It is increasingly being used at elite levels for high performance, for example, by football clubs such as North Melbourne.

This ready adoption of game sense in many areas of coaching may be due in large part to the learning outcomes that can emerge from such approaches, especially in terms of on-field performance. There are a number of potential outcomes from a game sense

approach that relate directly to match play and game day performance that are particularly relevant to coaches hoping to improve the performance of their players.

In developing training activities, coaches should consider what it is they hope to achieve from the practice activity. This will provide an idea of the intended learning outcomes and what sort of training activity is most appropriate. The potential performance outcomes for coaching from game sense approaches involves improvement for players in areas such as technical skill, tactical skill and decision making, team play and affective outcomes (motivation and confidence) (Breed 2010). These are displayed on the next page.

The coaching principles reflected in the game sense approach are discussed in Chapter 1 as explanations for why game sense is an effective learning tool, but provide a basis for the development of several learning outcomes for coaches.

Technical skills

- Skills learnt implicitly are less likely to break down under pressure, fatigue or distraction. A consistent technique can break down in game or competitive situations when exposed to distractions (external and internal), such as pressure, fatigue, noise and visual stimuli (Breed 2010). However, by practising in a game-related situation, players practice dealing with these distractions.
- More adaptable to game situations. As technical skills are practised in game-like situations in a game sense approach, the skill is more adaptable and less rigid than skills practised in isolated skill drills.

GAME SENSE COACHING PRINCIPLES

- IMPLICIT LEARNING
- CONSTRUCTIVIST NOTION
- PLAYER-CENTRED
- TRANSFER FOCUSED
- PRACTICE VARIABILITY
- PRACTICE SPECIFICITY
- CONSTRAINTS-LED



POTENTIAL LEARNING OUTCOMES SPECIFIC TO THE GAME



TECHNICAL SKILLS

- LESS LIKELY TO BREAK DOWN UNDER PRESSURE, FATIGUE OR DISTRACTIONS
- MORE ADAPTABLE TO GAME SITUATIONS
- BETTER RETENTION AND TRANSFER OF TECHNICAL SKILLS BECAUSE OF INCREASED PRACTICE VARIABILITY



TACTICAL AND DECISION MAKING SKILLS

- INCREASED TACTICAL KNOWLEDGE (KNOWLEDGE OF TACTICS AND APPLYING THEM IN PRACTICE)
- BETTER UNDERSTANDING OF WORKING OFF THE BALL
- INCREASED DECISION-MAKING (PATTERN RECOGNITION, MOVEMENT CUES)
- BETTER APPLICATION OF TECHNICAL SKILLS TO GAME SITUATION (TRANSFER)



TEAM PLAY

- INCREASED PRACTICE TIME WORKING TOGETHER SOLVING TACTICAL SITUATIONS (TRANSFER)



AFFECTIVE

- MOTIVATION (EXCITEMENT AND FUN OF PLAYING GAMES)

Potential learning outcomes of game sense specific to the game applied to coaching.

2

TACTICAL LEARNING IN TEACHING AND COACHING

Players practise adapting their passing skills during a game for example, to the specific requirements (constraints) of the task, such as adapting the skill for different throwing distances or angles. In isolated skill drills the same skill is practised over and over again with little adaptation required. Thus, when the player is asked to adapt the skill in a game situation, they have greater difficulty modifying the movement to match the environmental demands (players get more experience at adapting their skills to environmental and task constraints).

- Better retention and transfer of technical skills because of increased practice variability. As skills are practised in a game, game sense approaches tend to provide more variability in practice, with less repetition of exactly the same movement skill. This often translates into better retention of skills (contextual interference effect). Problem-solving activity enables players to explore solutions and develop solutions through trial and error learning. Learning from mistakes is important to the learning process. The limitation of more variable approaches, such as game sense, is often considered to be a reduction in the number of repetitions of the skill, so the amount of practice of each technical skill might be reduced.
- Better transfer of technical skills to the actual game. Transfer of practice to the game depends on how closely the practice resembles the game. Individual skill practice appears to be less representative of the performance of technical skills as it would be in a game than performance of the technical skills in game sense activities.
- More specific skill development. Practising technical skills in isolated drills does not appear to adequately replicate the situation in which the skills will be performed (i.e. the game). By practising in a games-based environment, specificity of learning is increased.

Tactical and decision making skills

- Increased tactical knowledge (knowledge of tactics and applying them in practice). Because players are using tactical applications in practice, an increased understanding of the tactical elements and how to apply them in a game situation can be developed. In invasion games for example, players come to understand the role of space in attacking and defensive situations.
- Better understanding of working off the ball. Players practise what to do when not in possession in invasion games. In invasion games, players spend most of their time not in possession of the ball, but what they do during this time is crucial to performance. Getting into a space to receive passes and create options for team-mates, denying space for opponents, understanding where the ball is likely to go in a game situation are all crucial skills that are important to practice in training.
- Increased decision making (pattern recognition, movement cues). By providing tactical situations that are repetitive, players can improve their decision making skills (for example, when and where to pass or run) through experience and learning from good and poor decisions (Breed 2010). As players are constantly making decisions and having

to recognise patterns of plays and pick up important movement cues, game sense can assist coaches in developing their players' decision making.

- Better application of technical skills to game situation (transfer). As technical skills are practised with more of the contextual elements of the actual game (for example, decision making, tactics, opponents, team-mates, pressure) game sense can assist in learning technical skills and constraints around technical skills that may be applied in actual game situations.

Team play

- Increased practice time working together solve tactical situations (transfer). Players get to work together to solve tactical problems that are representative of the actual game. This can assist in developing teamwork and also help players understand tactical solutions to situations within a game. It can also help them to better understand and read the play of their team-mates.

Affective

- Motivation (excitement and fun of playing games). Games are fun and exciting (more fun than repetitive drills). Having fun can

help maintain motivation in players at training and across a season. In addition, because game sense is a player-centred approach in which learners are provided with opportunities to explore solutions, it provides for an increased sense of autonomy in learning, which can be intrinsically motivating for players.

FEATURES OF IMPLICIT GAME-BASED TRAINING FOR COACHES

- 1 Player-centred – coaches guide or facilitate players to explore options by asking questions.
- 2 The emphasis is on decision making in certain tactical situations that might occur in a match.
- 3 Implicit learning – players often learn subconsciously by experiencing certain situations and learning from mistakes.
- 4 Indirect learning takes place through problem solving.