



Pearson

# INSIDE TRACK

Online magazine designed to support the  
teaching of Pearson GCE PE | January 2019



## Open and closed loop control

How different skills are  
controlled by the brain

Also in this issue:

**The energy continuum**

**Principles of training**

**Performing with confidence**

**Community sports support**

## Welcome to the fifth edition of *INSIDE TRACK*, the online magazine designed to support the teaching of Pearson GCE PE.

This termly magazine provides material to support centres in their delivery of the course, specifically the 2016 specification, with articles written by senior examiners and guest writers, together with reviews of resources that may be helpful for teaching or background reading.

### Get in touch

It is hoped that *INSIDE TRACK* will be a helpful resource for centres delivering the Pearson specification. If you have particular requests for how the magazine can support you, or wish to contribute, then please contact the editorial team at [insidetrackpearson@hotmail.com](mailto:insidetrackpearson@hotmail.com) or [teachingpeandsport@pearson.com](mailto:teachingpeandsport@pearson.com).

### Support materials

Topic guides, which provide additional detail about the content requirements of the specification, sample assessment materials, coursework examples and other useful resources to support the delivery of the course are available [here](#).

### Past issues

Did you miss an issue? Need to catch up? Just now discovered us and wondering what you missed? You can browse through the past editions of *Inside Track* [here](#).

## Contents

3	The energy continuum
4	Open and closed loop control
6	Personalising the Principles of Training
10	Confidence, Self-efficacy and Vealey
14	Supporting candidates in a community sports setting
17	Resources Review

*INSIDE TRACK* is produced by Dennis Tattoo, Penny Lewis and Steve Tutt.

# The energy continuum

Principal Examiners **Dee Gannon** and **Ellie Bunston** summarise the energy continuum; an important topic on the exercise physiology topic.

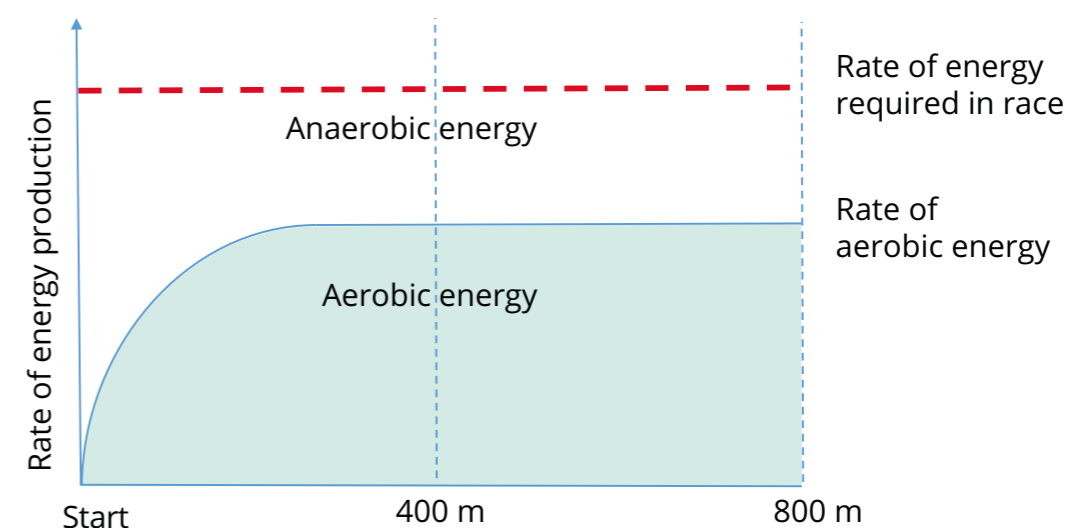
During a maximum effort, it is the duration of the activity that an athlete completes that determines the energy system being used, not the distance that they cover.

For example, Mo Farah will run 3000m in about 7m30s. However, a GCSE learner might take this long to complete 1500m. They would both be producing a similar percentage of energy from their aerobic and anaerobic systems.

The table below shows the percentage of energy from each energy system for a given time period. Notice that both the aerobic and anaerobic energy systems work simultaneously throughout exercise; the dominant system depends upon the duration of exercise.

Distance	200	400	800	1500	5000	10000
Time	22	49	1m53	3m55	14m00	30m00
% aer	29	43	66	84	95	97
% an	71	56	34	16	5	3

The contribution from each energy system can vary throughout a race however. The diagram below shows the energy required for an 800m race. Assuming that it is run at an even pace, the rate at which energy is needed will be constant (red dotted line).



At the start of the race, most of the energy will be produced by the anaerobic system because the aerobic system is slow to start. This results in an oxygen deficit. As the aerobic system speeds up, it produces more of the energy until by the end of the race it is the dominant system. This becomes more complex as tactics become involved and more complex again when we consider sports with repeated sprints.

Students might find this link helpful: <https://runnersconnect.net/energy-systems-running/>

# Open and closed loop control

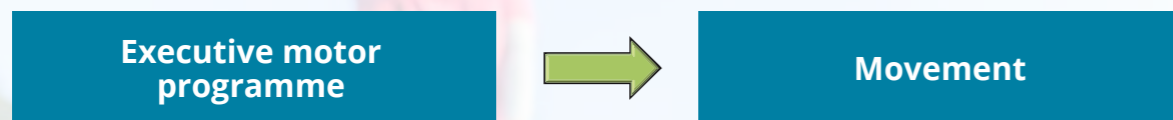
## What students need to know

Principal Examiner **Andrew Armitstead** offers a summary of the open and closed loop theory, which is covered in topic 3.6 in the specification.

The open/closed loop theory explains how different skills are controlled by the brain. Once the executive motor programme required has been selected by the brain, it has to be monitored and adapted if needed. This is done through three levels of control: Level 1 - Open loop; Level 2 - Closed loop; and Level 3, also closed loop.

### Open loop - Level 1

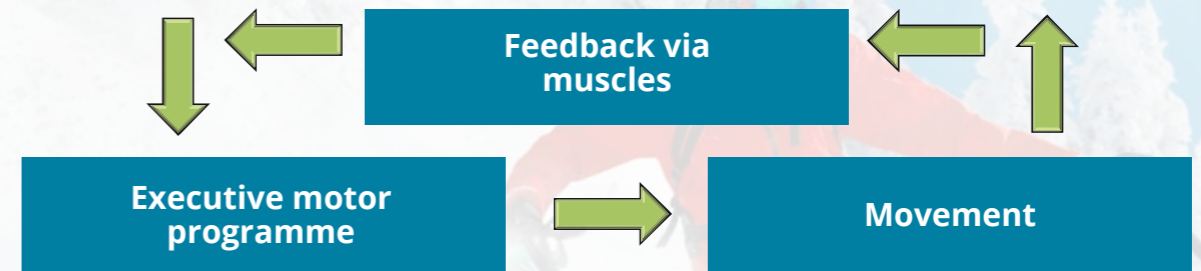
Open loop control is level 1 control that does not use feedback.



- No conscious thought is involved in the execution of the skill as the decisions have already been made in the brain
- All information is sent in one message to the working muscles
- Skill cannot be altered during execution
- This usually used to explain control for fast movements where there is little or no time to react
- Applies to skills that are simple, well-learned and have autonomous control
- Usually closed and self-paced skills
- Examples could be a golf swing, throwing a dart.

### Closed loop - Level 2

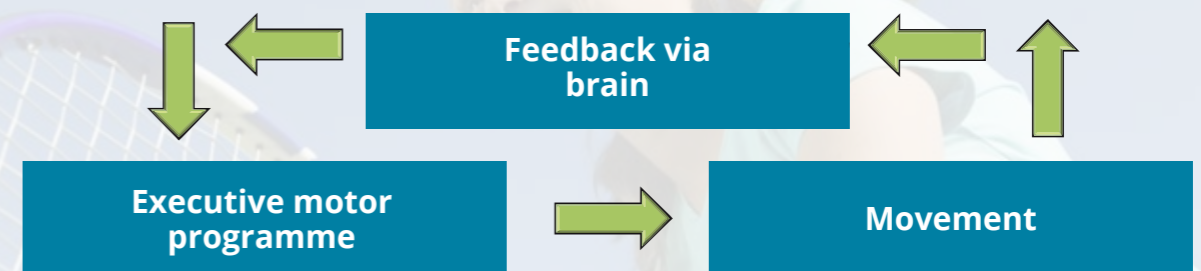
Closed loop control, level 2 control involves feedback which is sometimes termed the perceptual trace.



- The feedback is internal and gathered through proprioception and kinesthesia
- The feedback loop is short
- Control is via muscles rather than the brain
- Skill can be altered by performer during execution as a result of feedback as decisions are made in the brain during performance
- Applies to ongoing movements
- Examples could be balancing in dance, adjusting route through a slalom course for a skier.

### Closed loop - Level 3

Closed loop control, level 3 control involves feedback from the brain



- Has a longer feedback loop as the feedback is external rather than internal
- The performer has to pay conscious attention to feedback
- External factors such as the coach, co-actors, opponents etc. can cause the skill to be altered during execution as the information sent by the brain can be changed
- Control is via the brain
- Applies to ongoing movements and is useful for novice performers
- Examples could be passing a ball in netball, playing a shot in tennis.

# Personalising the Principles of Training



**Principal moderator Dane Smith offers advice about personalising the principle of training for the purposes of the Personal Development Programme (PDP).**

**Utilising the principles of training effectively is essential to designing any type of training or development programme.**

On the whole, candidates have a good level of knowledge and understanding of these principles. However, as stated in the 9PE0/04 Principal Moderators Report 2018, *some candidates need to personalise this better.*

For these candidates, typical work included definitions of each principle which was then followed by a generic, descriptive sentence regarding how they are going to apply this to their PDP.

In order to achieve higher marks, greater detailed application and accurate use of the principles of training is required.

For the purposes of this article, we look closely at the principles: **Specificity** and **Progressive Overload**.

## Specificity

The specificity principle refers to the most appropriate way to develop the required component(s) of fitness for your sport, that links to your overall aim(s).

Therefore, candidates need to target the correct energy systems, movement patterns and muscles as closely as possible to the way they are used in their sport.

For example, in basketball, approximately 75% of a player's energy comes from the PC system (1).

If the candidate wanted to improve their vertical jump in order to be more effective at gathering rebounds, more height on the jump shot or being able to attack the basket with greater height, then the relevant muscles associated with these movements will also need to be targeted when selecting the appropriate method(s) of training and exercises to implement within the PDP.

In this case, the lower and upper leg muscles would be targeted with the implementation of specific plyometric training that has been proven to developed vertical jump height (2).



## Progressive Overload

Fitness levels can only be improved if you gradually train harder, allowing your body to adapt to the increased demand.

Overload can be applied through increasing the duration of sessions, intensity levels, a change to more demanding exercises and/or increasing the frequency of training.

Candidates need to indicate specifically how they will be applying progressive overload, and this needs to be transparent in the recording of their sessions.

The inclusion of how candidates might incorporate periodisation into their PDP could be considered.

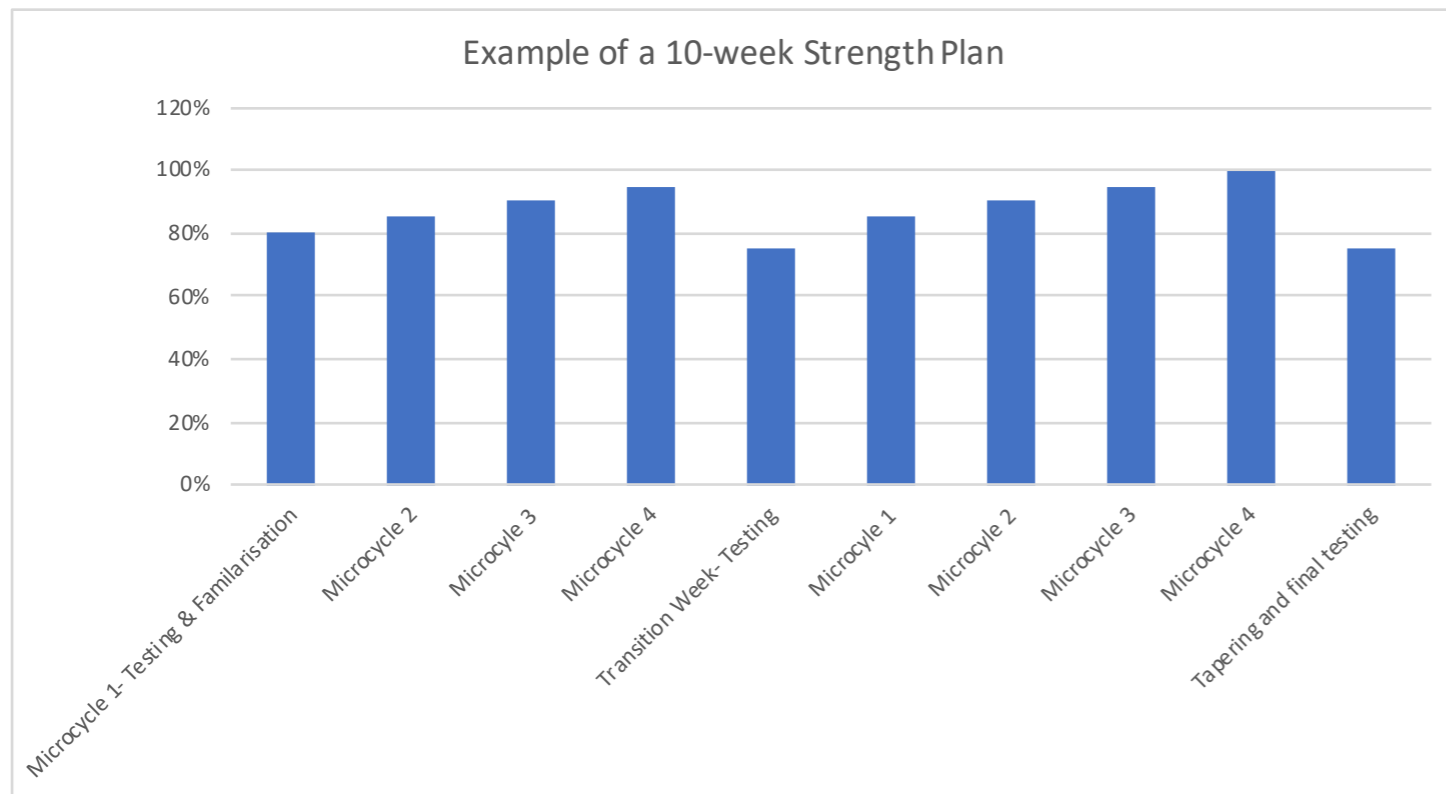
Below is an example of a strength training periodised plan illustrating the %1RM on the vertical axis, and the microcycles on the horizontal axis (3).

Notice how the plan is separated into two distinct mesocycles.

The 1st, 5th and 10th week of the adapted macrocycle illustrate either an initial familiarisation week (1st), or a transition/tapering week (5th & 10th), to allow for the body to recover between increased loads and for testing/re-testing purposes.

The transition week will also allow the candidate to re-establish training intensities for the 2nd mesocycle due to the high probability that strength gains have been made (considering all factors were adhered to).

Please note, the candidates are expected to show the changes in intensity levels within their training logs to effectively demonstrate full application of progressive overload.



### Tips:

- Make sure candidates include only specific information within the planning section of the PDP. Remember, the word count of 3500 overall will not allow for generic and descriptive content if higher marks are to be achieved.
- The above information is covered within Component 1 of the specification, therefore centres should encourage candidates to use and apply information that is specific to their PDP's.

### Bibliography

1. <https://physiologicalresponsesprepe.weebly.com/energy-systems.html>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2465309/>
3. <https://proformance.pro/athletic-development/strength-training-reap-the-benefits-of-planned-recovery/>

# Confidence, Self-efficacy and Vealey...

**Principal Examiner Colin Maskery examines the important links between confidence and performance.**

Individual performer confidence when preparing for and then performing in sport, is an underrated and often dismissed aspect – it can help overcome a lack of ability or negatively affect an otherwise accomplished performance.

Confidence, or self-confidence, has many similar definitions while that of 'a belief in one's own ability to successfully complete a task' and can often be simply termed as your own 'self-belief'.

Outside of the sports arena, having a high or a strong feeling of self-belief, is no different from that needed when taking your driving test or undertaking an examination. Elite athletes tend to possess greater self-confidence over those whom are less successful.

Self-confidence is built on many contributing and underlying factors. In 1977, **Albert Bandura** proposed his concept of **self-efficacy** – a sports specific form of self-confidence.

He identified **four factors** that come together to create this inner belief in your own ability to be successful.

The four factors have no order, but it is possible to rank them.

I would propose '**past accomplishments**' or '**mastery experiences**' is the most important.

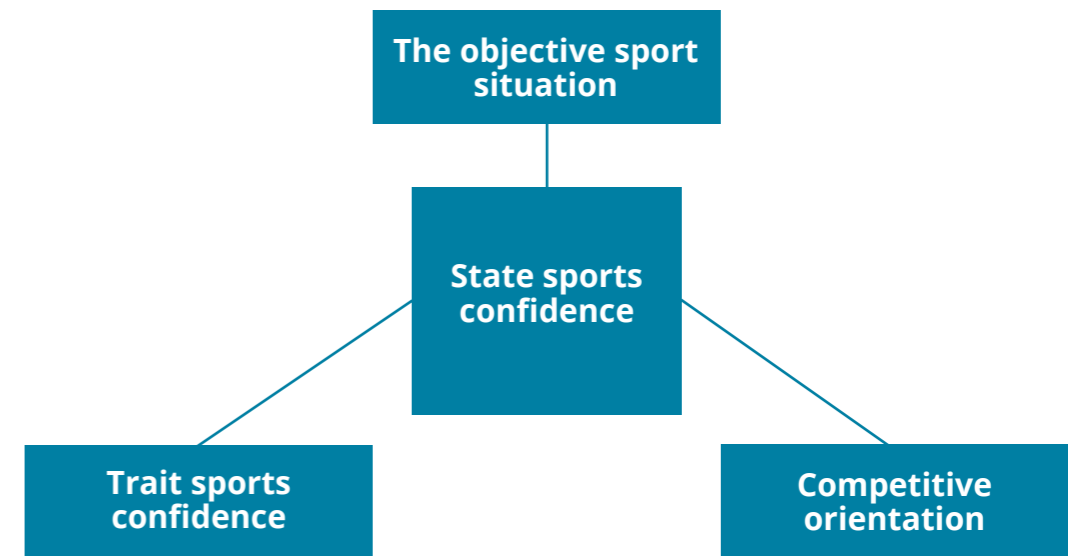
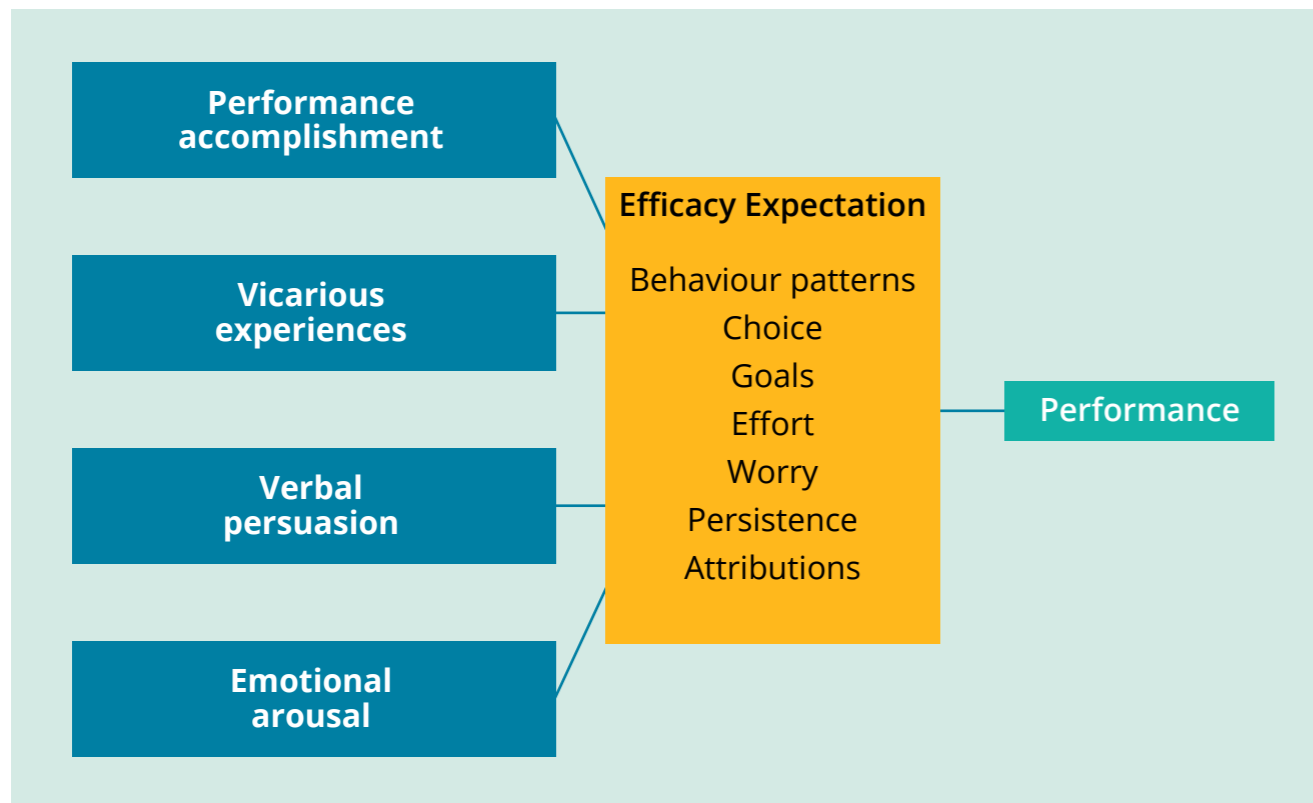
Drawing on previous experiences is a powerful force in shaping a performer's thoughts on an upcoming contest.

Second is the effect of '**verbal persuasion**' – this can carry more impact if the persuasion comes from a significant other: a coach you respect or your valued team mates.

Lastly, and ranked equally, will be the factors of '**vicarious experiences or observations**' – the viewing of others which carries greater impact if those others are similar to you (age/experience/gender).

And then finally, '**emotion arousal**' – this implies you must be willing to take part and align both your cognitive and somatic feelings to create a positive feeling or emotion, that you can be successful and you are in the *mood* to perform.





In 1986, Robin S. Vealey extended this concept further. She proposed a similar sport specific theory of confidence.

She defined sport confidence as:

*"...The belief or degree of certainty individuals possess about their ability to be successful in sport..."*

Success and an inner belief in one sport would transfer to another – this would seem a sensible and yet not complete link. We all could claim as physical education students to be proficient in at least one sport, but not good at all sports.

Vealey based her theory on two factors:

- **Trait Sports Confidence** (SC Trait)
- **State Sports Confidence** (SC State)

**Trait Sports confidence** is innate and can be described as a natural disposition and is relatively stable.

We all know someone who always appears to be confident in their abilities. It is a generalised belief, is global and reflects the belief that you will be successful across a range of sports.

**State Sports confidence** can be learned and developed, but unfortunately is changeable and therefore unstable. This form of self-confidence is specific to a situation and reflects an individual's belief about the extent to which a performer's ability will bring success at a particular moment.

State Sports confidence is built up or dependent on the interaction of 3 factors:

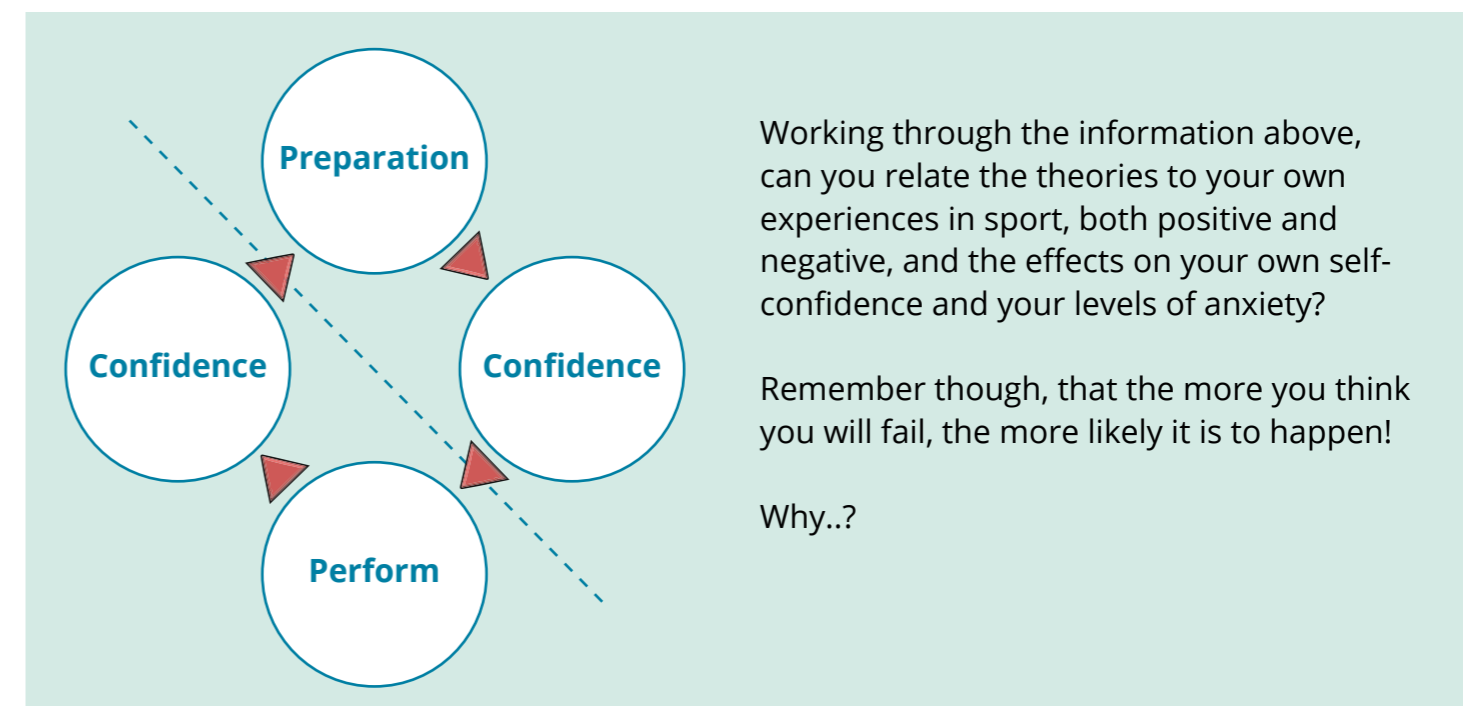
- Trait sports confidence as an overriding global sense or feeling – your naturally a confident person.
- The objective of the situation – type of skill to be performed, situation, event status.
- The performer's competitive orientation – the level of a performer's motivation to successful, preparedness to compete, drive to achieve a product goal.

The extent to which the athlete perceives the performance has been successful is termed the subjective outcome. The subjective outcomes produce the following effects:

- ◆ Firstly, an outcome which is perceived to be good will increase trait sports confidence and competitiveness. State confidence will also increase.
- ◆ Secondly, an outcome which is perceived as poor will decrease trait sports confidence and competitiveness. State confidence will also decrease.

Vealey mirrored the work of Bandura in suggesting the following factors as contributing to increasing your state sports confidence (SC State):

- Mastery of skill – how good you are
- Styling – confidence will increase if the performer can demonstrate a highly skilled performance seen in significant others
- Physical and mental preparation
- Social reinforcement – praise and approval by significant others
- Effective leadership promotes confidence
- Environmental comfort – feeling comfortable in suitable conditions



Working through the information above, can you relate the theories to your own experiences in sport, both positive and negative, and the effects on your own self-confidence and your levels of anxiety?

Remember though, that the more you think you will fail, the more likely it is to happen!

Why..?

# Supporting candidates in community sports



**Chief examiner Dennis Tattoo offers suggestions to centres which have students active in a sport in a community setting.**

I was fortunate enough last summer to visit a number of centres, with fellow moderators, to observe live moderation events.

I saw at first hand many well organised practical sessions for motivated and enthusiastic candidates.

Not surprisingly, the vast majority of activities seen at these events are those readily found on many high school curricula from Key Stage 3 upwards.

With the 2016 specification now firmly established in schools and colleges, there is a sizeable minority of students who pursue their sport away from school in community settings.

These students are likely to be developing their performances in community based clubs or outdoor centres. This brings with it the challenge for teachers to support candidates, who they may not see perform on a regular basis.

**What practical steps can centres take to support students in this situation?**

Once a student has indicated their preference for a practical option outside of school, whether as a performer or coach, having an early conversation with an appropriate club official helps to establish clear communication lines at the outset of the two-year course.

Establishing an effective working relationship with the identified coach and sharing details of the practical specification and assessment arrangements, allows community-based coaches, and officials, a clear idea about the specification requirements, and helps avoid a rushed assessment process as the moderation window approaches.

Agreeing how best to support the candidate at the beginning of the course and sharing, for example, the guidelines for recorded evidence, can also help avoid problems in the weeks leading up to the moderation.

Good practice observed in centres includes the student, school and club discussing the candidate's strengths and weaknesses to inform a personal improvement plan ahead of the assessment.

These plans would include times when progress is reviewed, perhaps a brief termly conversation over the telephone with a more formal review a few weeks before the moderation event and at the start of the A Level year.



It is important that students do not feel isolated from the school if their sport is off-site.

I am aware of mentoring schemes where an identified member of school staff sees a candidate, at regular times across the school year, to provide support as necessary about a wide range of issues, such as managing sports and academic demands, nutrition and recovery from injury.

In a development-driven setting, mentors can work with students on goal setting to achieve success at A level and beyond.

Where possible, and certainly on the approach to assessment and moderation, it is important that teachers undertake a shared observation

of the student together with the club coach, or equivalent.

A joint observation, working with the published assessment criteria, provides an opportunity for rigorous assessment and to compile evidence to support the mark awarded.

There is little doubt that students who pursue their sport away from school need to be supported as much, if not more than, those students who are playing regularly for the school team.

A brief telephone conversation with a key club official is often the catalyst for developing a collaborative approach to enabling student success.



*Many centres have students pursuing sports away from the school setting. Establishing an effective working relationship with the club coach, including details of the specification and assessment arrangements, can help provide optimum support for the student, especially as the time for final assessment and the moderation approaches.*

# Resources Review

Books, websites and technology

Chief examiner **Dennis Tattuo** continues Inside Track's regular review of the latest sports technology, books and websites, which teachers and students might find of interest.

## BatSense – a *Smart* cricket bat

**Following on from the increasing use of Smart technology in racquet sports, like tennis, cricket is another sport now able to provide real-time data about the quality of precision of bat on ball.**

BatSense, has been produced through a collaboration between Intel, the International Cricket Council's Innovation partner, and sports start-up Specular.

The technology provides real-time data of the bat speed and angle from the point the player starts his or her back-lift, through the playing arc to the ball, the moment of impact and then the follow through.

This data is sent instantly to a computer for analysis by player and coach.



The chip providing the data is very light (around 20 grams) and fits neatly into a sleeve covering the bat handle underneath the rubber grip.

The chip contains an 'Intel Curie' compute module, which processes wireless data with motion sensors and built-in algorithms.

The feedback allows errors to be highlighted in the players's performance, which can be used by coaches to fine-tune technique.

Coaches at elite level, like Graham Thorpe and Dean Jones, are already using BatSense with international players.

In time, the technology will be used at club and academy level, to enhance feedback to coaches and players.

*BatSense technology is a useful aid to performances at all levels of the game*

## TrackMan – technology that even the best golfers can learn from

TrackMan 4, as featured on the BBC's Click programme, is the latest version of the company's technological support for golfers, using dual-radar technology to gather 27 data points about club and ball.

The optical motion analysis offers immediate feedback to player and coach on distance, power, club-head speed and trajectory.

The machine is able to offer analysis of all aspects of the swing, and enables the camera to record the swing which is then replayed via phones, tablets or computers, using bluetooth connectivity.

These images, together with the data, provides complete and immediate feedback to the player.

Elite Performance Coach Dave Aldred, whose book the Pressure Principle was reviewed in the last edition of Inside Track, considers the immediate nature of the feedback provided by TrackMan to be invaluable to enhancing performances of even the most gifted players.



2018 Open Champion Francesco Molinari, is just one of golf's leading players to utilise the Trackman technology to further refine his technique, commenting that he considers it to be essential to advancing his technique.



## Sport Psychology – a complete introduction

Part of the *Teach Yourself* series, Dr John Perry's book is ideal for teachers and students who seek an accessible book to provide an overview of major theories and recent research.

It is readable and well-structured, and uses a combination of quotes, case studies and key facts to explore important theories.

Each chapter concludes with a helpful multiple choice quiz to help readers check their understanding.

The book covers much of the 2016 specification in appropriate detail and would be a useful resource beyond A level.

