GCE Physical Education 2016 Component guide 5: Skill acquisition

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Introduction

The specification has been developed in consultation with the teaching community, higher education, learned societies and subject associations. Tutors from a range of schools and colleges – in focus groups, phone interviews and face-to-face conversations – have given feedback at each stage and have helped us to shape the specification. Physical Education academics in UK universities have helped us understand how to build on the strengths of the 2008 A level specification and advised on how progression to undergraduate study could be improved. Component guide 5: Skill acquisition gives an overview of the new specification relating to this topic, to help you get to grips with the changes to content and assessment, and to help you understand what these mean for you and your learners.

Overview of changes

From September 2016, GCE Physical Education will be a linear qualification. This means that all examinations must be sat at the end of the two-year course. From September 2016, AS level Physical Education will be a stand-alone qualification. This means that it cannot be used to contribute towards an A level Physical Education grade. More information about the changes to subject content are given later on in the guide. Each award will have two examinations – a scientific exam and a psychological and social exam. This is a change from 2008. There is an increased focus on the theoretical content, now worth 70 per cent of the grade. The Psychological and Social Principles exam includes Topic 3: Skill acquisition, Topic 4: Sport psychology and Topic 5: Sport and society. The subject content includes a more detailed need to develop quantitative skills – now worth up to 5 per cent of the qualification. Learners are required to show an understanding of the nature and development of skills in sport. This understanding could be enhanced and developed through applied practical experiences in the role of either coach and/or performer. Learners should have an awareness of the relevant learning theories and how they relate to skill development. At A level, learners will develop a detailed appreciation of the role of memory systems in the acquisition of skill. Learners are expected to be able to relate knowledge of practices, feedback and guidance to practical performance situations. Learners should be able to understand how quantitative data can be generated in appropriate areas of skill acquisition and be able to produce and evaluate the meaning of such data.

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Where AS differs from A level

Year 1 content covers skill acquisition. However, at A level there is an additional topic of **memory models** and how these are used to acquire skill**.** A Level topics are shown in bold type throughout the booklet.

Key content

3.1 Coach and performer

Learners should understand the four coaching styles to improve the performance of learners: command, reciprocal, guided discovery and problem solving. This includes knowing what activities you might teach with each style and why, as well as the characteristics of a session in this style. Learners will be expected to understand when a coach might use a particular type of coaching and why. For example, command style might be used for teaching javelin to a class because it is a dangerous activity and therefore the tutor knows that it is safe for the group.

Learners should be able to discuss the development of tactics and strategies in a competition or performance using their own sporting examples to support this. Leaners should also explore simple ways of developing tactics and strategies in a competition or performance to optimise outcomes. This should be an overview given the vast array of options for the number of potential sports. Examples could be changing formations, player positions, defensive versus offensive strategies and tactics. This can be applied to a student's own sports. They should be able to show knowledge about how this will optimise outcomes for a performer. For example, tactics performers would use in different situations and how will this enable them to overcome an opponent.

Dissection of a skill in order to identify technical elements: preparation, execution and recovery phases leading to the correct result or outcome. This is an example from putting in golf:

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Technical analysis Preparation: The backstroke in putting is the preparation. Your eyes should be directly over the ball. Check the line of putt to make sure that you are in the right position. Your feet should be shoulder width apart for balance. Your arms should swing in a pendulum motion, so this creates a nice rhythm when lining up towards the ball. Both your knees should be slightly flexed so you have good balance when taking the shot. Execution: When you connect with the ball on your stroke that is the execution. Your feet should still be shoulder-width apart. Arms should still be parallel with the body, make sure your rhythm hasn't sped up or slowed down because you will leave it short or hit it too long. Recovery: After you hit the ball your follow through is the recovery. Your shoulders and arms should be still producing a pendulum motion and your shoulders should still be parallel to the club. Also your club face should be aiming at the target and the putter face should be parallel to the ball. The movement of your golf club must be like the movement of a clock pendulum. With all things equal, the ball will travel longer downhill and shorter uphill.

Learners should be able to explain a skill, breaking it down into the component parts, in order to identify any technical strengths and weaknesses using these phases. For example, by looking in detail at the recovery phase you may notice a particular strength or weakness within this. Learners can use examples from their own sports. There is no requirement to be able to do this in specific named activities. Questions will allow learners to support with their own examples. This is an example of the sort of detail you would include for your own performance. To compare with a higher-level performer, you would need to do the same for their performance – perhaps putting the two alongside each other, and then make comparisons between them:

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Figures from student work.

Skill 1 – putting (stage 1)	Analysis of my performance
Feet are shoulders width apart. Club face is parallel with the feet to produce a good stroke. Head is all was over the ball. Elbows are both extended to produce pendulum motion.	My feet and shoulder alignment are correct however I could improve on extending my elbows to produce more pendulum action. My head position is correct which is over the ball.
(Stage 2) Shoulders and feet are still parallel. Feet are still shoulders width apart to help for balance head is still over the ball, and shoulders are away from the body to produce a pendulum motion. Both arms are still extended. Club is also parallel with ball.	Club face was not parallel to the ball when struck, so the ball is not going where I want it to. Apart from that my feet and shoulders were parallel and head was over the ball.
(Stage 3) Shoulders are feet still parallel. Feet are shoulders width apart for balance. Club face is still parrallel after striking the ball. Both arms are still extended.	My clubs face is parallel after striking the ball. Shoulders and feet are still parallel. But both of my arms are both flexed so little movement is happening, so when I strike the ball it is not a good connection.

Useful resources include:

• Covers communications skills

• https://www.youtube.com/watch?v=Y0xiwnxVbns Introduces group management)

• https://www.youtube.com/watch?v=SUY5jUyp2Oc Covers coaching sessions

• https://www.youtube.com/watch?v=FSPJ_H9-yVk Includes effective questioning

• https://www.youtube.com/watch?v=d0ag_a_bgZM&feature=youtu.be Deals with the topic of game preparation

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3.2 The classification and transfer of skills

Learners should have a knowledge and understanding of skill classifications. Classification continuums as gross/fine, internally paced/externally paced, discrete/serial/continuous, open/closed. www.brianmac.co.uk/continuum.htm is useful to get further explanation of these. Which skills fall into which categories and why? Learners should be able to give examples of sports for each. The BrainMac website above also has useful information on the open/closed continuum in relation to the sporting environment, decision-making and practice structure. Learners should be able to understand the uses of transfer of skills. Transfer as positive/negative, proactive/retroactive, bilateral and zero. Transfer as the effect of one skill on another as a result of practice/experience. Learners must be able to understand how this knowledge can assist performance. For example, if someone has played football before, an example of positive transfer is that they are likely to grasp the tactics of hockey quite quickly. Likewise, someone who has thrown a netball before is likely to be able to throw a basketball. An example of zero transfer is where the skills from one sport have no impact on learning a new sport. For example, a swimmer transferring to archery. Beashel and Taylor's book *Advanced Studies in Physical Education and Sport* has a good section on this topic. Useful resources include:

- https://www.youtube.com/watch?v=zIbaPffaacw Skill
- https://www.youtube.com/watch?v=MyJzoXqfVx4 Classifications of skills
- https://www.youtube.com/watch?v=DT38s31gOvM Classifications of skills)
- https://youtu.be/RRhuLsMQIaU Transfer of Learning

3.3 Learning theories

Learners need to know and understand the associative theories (classical and operant conditioning). They should be able to apply these theories to practical examples. For example, in operant conditioning the consequences of our actions determine whether we will repeat it or not. Skinner's theory of operant conditioning involves the correct response to a situation or task being rewarded. This reinforces the correct response. This behaviour is shaped by the coach and the player need not understand why they are performing like this, just that they will be rewarded if they do it correctly. Examples in sport are situations such as football shooting practice. The coach may direct the players to strike the ball into the right of the goal. If this is done they are rewarded. The area is then reduced to the top half of the right side, and then maybe the top right hand corner only. Rewarding this behaviour strengthens the link. (www.teachpe.com/sports_psychology/learning_theories.php)

There is a good section in the Beashel and Taylor book on this topic. Reinforcement should be

understood (positive, negative, punishment and stimulus–response (S–R) bond) and its use in skill learning. Different types of reinforcement work better in different practical examples and learners should be able to apply their understanding to examples. For example, positive reinforcement through praise and encouragement from a coach should encourage performers to want to repeat the skill. Learners should be able to distinguish between the different types of reinforcement and their effect on the performer. It should be noted that punishment and negative reinforcement are not the same. Davis et al.'s book, *Physical Education and the Study of Sport* has good information on this section.

Thorndike's three laws: 1. The law of readiness, 2. The law of effect and 3. The law of exercise. Learners need to be able to understand the laws and apply them to practical situations. Davis et al.'s book is very good on this topic. For example, in

the law of effect there are satisfiers (where the desired response is rewarded) which will strengthen the stimulus response bond whereas annoyers will weaken the response.

For Fitts and Posner's three stages of learning (cognitive, associative and autonomous) detail can be found at https://www.youtube.com/watch?v=OHGE68ZS8g4
For each stage learners will need to be able to discuss the characteristics and coaching requirements. They will also need to be able to comment on the type and role of different types of feedback at each stage. For example, when someone is first learning a skill and is in the cognitive stage coaches need to supply plenty of feedback which could be visual (demos), verbal (instructions) or manual (guidance) to assist the learners in knowing how to do the skill correctly. The following website is also useful for this section:

• www.believeperform.com/performance/skill-acquisition-in-sport-the- journey-to-expertise,

Other useful resources include:

• https://youtu.be/Ry0awoLKS2E
• https://www.youtube.com/watch?v=zxkaLQwl34c
• https://www.youtube.com/watch?v=PsTlJyox0Kg
• https://www.youtube.com/watch?v=H6LEcM0E0io
• https://www.youtube.com/watch?v=BHb8YplRvgY Covers work on classical conditioning
• https://www.youtube.com/watch?v=VH58p0JhKhE Includes operant conditioning)
• https://www.youtube.com/watch?v=FSJ2eX49Z1c
• (Comparing Classical to Operant Conditioning)

• https://youtu.be/kUcKlJsu4Ds Stages of Learning

• https://www.youtube.com/watch?v=0Sv2H5iXebU Includes Social Learning Theory

• https://www.youtube.com/watch?v=8zgyNl6LuWM Covers Social Learning Theory)

• https://www.youtube.com/watch?v=opt05kllJZw Covers Thorndike's three laws

3.4 Practices

Learners need to have knowledge and understanding of the practice methods. Coaches should structure a training session in different ways based on their understanding of this. This impacts on performance. Practice methods are part, progressive part, whole and whole part whole. Practice structure as in massed, distributed, fixed and variable. Learners need to understand why one type would be more beneficial to another, supported with examples. If a learner was given two different structures or methods, they should be able to explain which is most appropriate for a particular athlete and why.

• www.brianmac.co.uk/teaching.htm has explanations of the practice methods. Learners need to understand the different methods and why a coach might use them in different situations. For example, a coach might teach a complex skill like a tennis serve as whole part whole, because the coach would want them to see the whole thing. They would then teach them the elements before putting it back into the whole skill again. Learners need to know why coaches select the appropriate methods and how they will measure effectiveness of them.

Learners need to be able to analyse how mental practice can enhance performance by linking this to their knowledge of learning. For example, the effects of mental practice versus no practice or physical practice only on an athlete. Useful resources include:

• https://www.youtube.com/watch?v=6YWJ95bHjXU

• https://www.youtube.com/watch?v=pOkK4rOhMGo

• https://www.youtube.com/watch?v=vPtHjGRRWuY

• https://www.youtube.com/watch?v=MCcObbXXhII

All the above clips cover practice methods

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3.5 Guidance

Learners should study the types, purpose and effectiveness of guidance methods: visual, verbal, manual and mechanical. Visual guidance in the form of demonstration and visual materials. Verbal guidance in the form of knowledge of direct, indirect and prompting. Manual and mechanical guidance in the form of physical support and aids, restrictions and forced responses. Learners should be able to understand the types of guidance, their usefulness for coaches and how they apply in the different stages of learning, which links back to the previous topic.

Learners need to know and understand the uses of technology to underpin guidance methods in order to optimise performance, e.g. to measure, monitor and evaluate performance. Information on technology can be found in Component guide 4: The role of technology; video, GPS and heart rate monitors. For example, a swimmer being dragged through the water at world record speed is an example of technology being used to guide the swimmer, they therefore know what it feels like to perform at world record pace. Resources on guidance include:

• https://www.youtube.com/watch?v=mMM16sjkdEI
• https://www.youtube.com/watch?v=mzCn6zT_UCk

3.6 Feedback

Wesson et al (2005) *Sport and PE: A Complete Guide to Advanced Level Study. (Third Edition)* is a good resource for this whole section. Learners need to understand the types, purposes and effectiveness of feedback as motivation, reinforcement and detection and correction of errors. Types of feedback as in positive/negative, knowledge of performance, knowledge of results, concurrent/ terminal and intrinsic/ extrinsic. Learners need to consider when coaches would use different types of feedback and why they might select one in preference to another. The uses of technology to support types of feedback in order to optimise performance is covered in the technology booklet. An example is dart fish software or GPS tracking monitoring and providing feedback to the team. Learners should be able to analyse how technology can assist with optimising performance supporting their ideas with examples from sport. Open and closed loop control is also covered well in the Wesson et al's book. Open loop models include input, executive system, effector system and output. Closed loop control models include input, executive system, effector system, output and feedback. Application of when each loop could be used. For example, the closed

loop works well with movements taking place over a long period of time such as continuous running and not as good for quick discrete movements. However, performers will continually move between both systems as most sporting activities require fast, slow, simple and complex movements in combination. Resources include:

- https://www.youtube.com/watch?v=ti-kHX3pbWE
- https://www.youtube.com/watch?v=jOTy1m_Zm8g Each clip covers the use of positive feedback

3.7 Memory models

Learner's need to understand the components of information processing including input, stimulus identification, perception and selective attention, response selection, response programming, output (based on the models of Welford and Whiting). They also need to understand the detection, comparison and recognition (DCR) phases. Wesson et al's textbook has good information to support understanding of this section. Whiting's Model: Learners should be able to understand the model and explain why it is important for performance. They should be able to discuss the three stages.

Please visit: www.slideshare.net/jmaaspe/information-processing-l2

Other useful resources include:

- https://www.youtube.com/watch?v=pMMRE4Q2FGk
- https://www.youtube.com/watch?v=HjcZY00LwNs Information Processing
- https://www.youtube.com/watch?v=7gZGX10bp_g Information Processing
- https://www.youtube.com/watch?v=Ip7vNkdWBiY Schema Theory
- https://www.youtube.com/watch?v=_guc0bvTB2A Open/Closed Loop
- https://www.youtube.com/watch?v=-o8pcWC81Xc Memory and Memory Models

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Welford's model:

Figure taken from: https://quizlet.com/99257328/ch-52-sehs- information-processing-flash-cards/

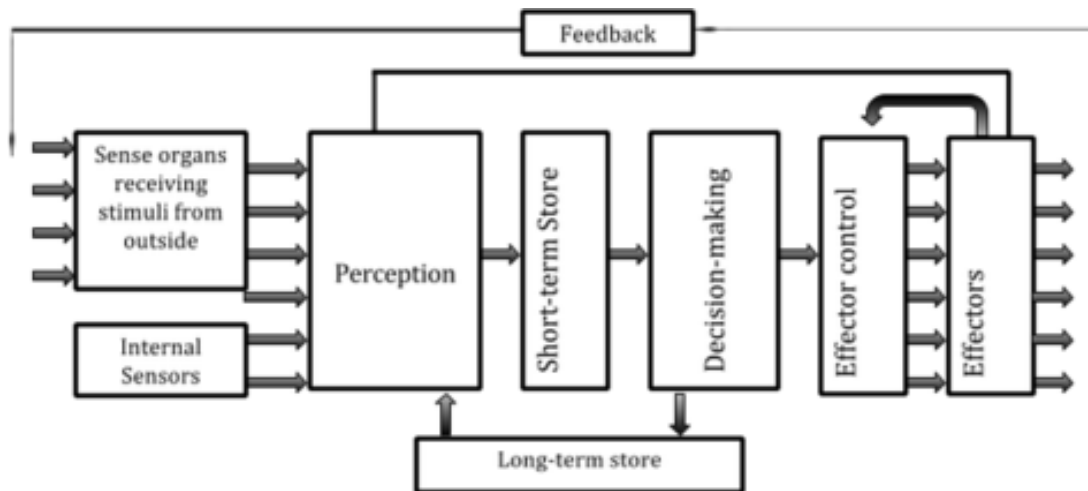**The three memory systems as short-term sensory store (STSS), short-term memory (STM) and long-term memory (LTM). Learners need to understand the characteristics of each of these systems, as well as capacity, duration, encoding, chunking and selective attention. Learners should have a knowledge and understanding of each system and the links between them. Wesson et al's textbook contains good detail on memory and all of these elements. For the long-term memory learners need to understand the capacity, duration, encoding, recall and multi-store memory. Learners need to understand the link between STSS, STM and LTM in terms of retrieval and rehearsal and how this affects output. Learners also need to be able to measure reaction and response times using appropriate technology. For example, they should understand the use of timing gates and electronic sensor timing. Beashel and Taylor give good detail on the topic of Hick's law. Learners need to understand the law and reactions to both simple/choice reaction times. Learners will need to be able to plot, interpret and analyse data generated from reaction and response times. For example, plotting and analysing a graph such as the one that can be seen from the website: https://www.tes.com/teaching-resource/understanding-graphs-showing-rates-of-reactions-6390365**

Learners must be able to understand the psychological refractory period; what it is and the implications to a coach and performer in optimising performance. Beashel and Taylor's book has a good explanation of this. Lastly, learners will need understanding that schema theory is an organised

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package of information stored in LTM that updates and modifies motor programmes. Recall schema is information about producing the movement. Recognition schema judges the movement. Schemas based on knowledge of the initial conditions, response specifications, sensory consequences and movement outcomes. Learners should understand the implications of schema theory to a coach and performer in optimising performance. Scheme theory is well documented in Wesson et al's book. Schema theory is about us having a set of patterns around certain movements. This means that we are not memorising a specific pattern for every individual performance that we do but rather that we have created a schema for it. Learners must be able to consider how this is different from closed loop theory and memory models. Learners should be able to compare the differences between the different models studied. There are also criticisms of memory theory. For example, how can we create a new performance in an activity we have never done before if we have no memory of how to do it? Learners should be able to link knowledge of practice methods and feedback to this. For example, varied practice conditions and avoiding massed practice would be preferable for developing schemas. It would also be advisable for athletes to have plenty of continuous and terminal feedback. This knowledge can also be linked to skill transfer.

Detailed content changes

This topic is new compared to 2008 but a lot of the topics did feature in the specification before that. A lot of the coaching, guidance and refinement of technique topic areas would have been shown to learners in centres to support their knowledge for the coursework as part of the performance analysis in the 2008 specification for the technical and tactical but it was not explicit content. Here it is much more explicit in its theory content and is now examined.

3.1 Coach and performer

Coaching styles were not included anywhere in the 2008 specification. Tactics and strategies would have been covered in 2008 under the tactical element of the performance analysis coursework task at AS but now this content will be tested via an examination. Dissecting a skill, analysing strengths and weaknesses, and comparison to an elite performer would have all been included as part of the AS performance analysis coursework task but this content is now examined. In 2008 skill development and tactics was a section in the examination including refining technique under long-term technical preparation in unit 3.

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3.2 The classification and transfer of skills

This section is all new in 2016. However, if you taught the specification from 2000 there is a lot of material that is still relevant from this specification.

3.3 Learning theories

This section is all new in 2016. However, if you taught the specification from 2000 there is a lot of material that is still relevant from this specification.

3.4 Practice

This section is all new in 2016. However, if you taught the specification from 2000 there is a lot of material that is still relevant from this specification.

3.5 Guidance and 3.6 Feedback

Mostly this section is new in 2016. However, if you taught the specification from 2000 there is a lot of material that is still relevant from this specification. The 2008 specification included technology for optimising performance under long- term technical preparation in unit 3. This is now specifically directed at guidance and feedback.

3.7 Memory Models

This topic is new in 2016, though again if you taught the specification from 2000 there is a lot of material that is still relevant from this specification.

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Delivery approaches including ideas for practical delivery

This unit lends itself to a practical approach as much as possible.

Topic	Ideas for delivery
Coach and performer	• Learners to plan and lead a session on the different coaching styles then decide which sports suit them best and why they might use the different approaches. • Break down a skill from your own sport into its technical elements. • Analyse your own performance or a specific skill v an elite athlete (like a mini technical and tactical analysis from 2008 specification).
The classification and transfer of skills	• Practical lessons to show how skills can be transferred, for example from a rounders ball throw to basketball throw to javelin throw, and using technique across all activities. • Demonstrations of the different skill classifications by playing different sports that show them.
Learning theories	• Teach the class a new skill such as origami and explain the stages. Relate to learning to drive if anyone learning. • Have three groups when teaching something such as a maths puzzle and give the three groups different types of reinforcement to illustrate. • Create your own practical experiment such as throwing hoops in to different sized buckets and get different groups of learners to give different types of reinforcement. Comment on how it affected their performance?
Practice	• Teach skills using all the different practice methods – either learner or tutor led.
Guidance and feedback	• During practical sport lessons demonstrate all the forms of guidance and feedback and get learners to make a guidance leaflet for a newly trained coach explaining them all.

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Memory models	• Plotting, interpreting and analysing data generated from reaction, movement and response times to illustrate Hicks law.
	• Kim's game and then coaching learners to practice chunking to remember more.

Quantitative skills guidance

There are some topics in this section that lend themselves to quantitative skill

• The use of technology to measure, monitor and evaluate performance.

• The use of Hicks Law use of reaction time and data reflecting an understanding of reaction time and Hicks law.

• Plotting, interpreting and analysing data generated from reaction, movement and response times.

• Analysing and interpreting results from linear, typical, positive acceleration, negative acceleration and plateau.

• Plotting graphs to reflect learning data and different types of curve.

• Discussion about the graph. For example, the limitations of curves measuring performance not learning, issues with mean-averages lacking reflection of individual performance. The key thing in this topic is that learners can comment on graphs and tables, and apply their theoretical knowledge to this. They must get experience in this skill, as there will be quantitative skills questions on the examination paper making up 5 per cent of the marks.

Sample questions

Regular testing of learners on the key terms in the glossary that are part of the specification is important (see Appendix 7, page 88). When practising questions ensure that tutors and learners are using the command words in the specification and that learners understand the requirements of each command word. Please see the Sample Assessment Materials for examples of questions. In section A of the A level Psychological and

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Social Principles paper questions 1 and 6 are examples of this topic. In section A of the AS SAMs papers questions 2, 3 and 4 are from this topic. To ensure understanding, questions could be given to learners starting:

• Performers use guidance...

• Performers use feedback...

• A skill can be classified...

• Learning theories...

• A skill can be learnt...

• Memory models are... These topics also link together so it is important that learners can draw on knowledge from topics and be able to link them together.

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Resources and references

Useful textbooks

• Baddeley, A., Eysenck, M. and Anderson, M. (2009) **Memory**, Psychology Press

• Beashel, P. and Taylor, J. (1999) **Advanced Studies in Physical Education and Sport**, Cheltenham: Nelson Thornes

• Davis, R., et al. (2000) **Physical Education and the Study of Sport**, St Louis, MO: Mosby

• Hodges, N. and Williams, M. (2012) **Skill Acquisition in Sport: Research, Theory and Practice**, London: Routledge

• Honeybourne, J., Hill, M. and Moors, H. (2004) **Advanced Physical Education and Sport for A Level (Third Edition),** Cheltenham: Nelson Thornes

• Wesson, K., et al. (2005*) Sport and PE: A Complete Guide to Advanced Level Study (Third Edition),* London: Hodder Education.

Useful websites

The classification and transfer of skills:

• www.brianmac.co.uk/continuum.htm Learning theories:

• www.ehlt.flinders.edu.au/education/DLiT/2004/18stages/multi_stage_theory.htm

• www.believeperform.com/performance/skill-acquisition-in-sport-the-journey-to- expertise

• www.hsc.csu.edu.au/pdhpe/core2/focus2/focus4/4017/fac2_4.htm.

• www.teachpe.com/sports_psychology/learning_theories.php

Practice methods:

• www.brianmac.co.uk/teaching.htm

Guidance:

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- www.hoddereducation.co.uk/media/Documents/magazine-extras/PE Review/PE Rev Vol 8 No 3/PERev-8_3-Guidance-techniques.pdf?ext=.pdf