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Optimising instruction and feedback in Physical Education. The application of OPTIMAL Theory in practice

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The development of motor competence is critical for a child's holistic development and engagement in physical activity across the lifespan. As physical education becomes more marginalised in school settings, efforts are needed to enhance the quality of movement skill learning environments. One such approach is through the optimisation of task design, instruction and feedback which engages learners in key attentional (external focus of attention) and motivational (enhanced expectancies and autonomy support) processes. This paper aims to provide practical examples of how these key attentional and motivational factors can be applied by teachers in physical education lessons to optimise the learning of motor skills and motivation to create a physically literate learner.

KEY WORDS: Physical education, External focus of attention, Enhanced expectancies, autonomy support, Motor competence.

Background

Formalised physical education is an effective setting to directly develop children's motor skills and provide them with the motivation, confidence, and physical competence to participate in physical activity throughout the lifespan (Morgan et al., 2013; Stodden et al., 2008; Whitehead, 2019). In particular, motor competence has been identified to play a critical role for children's holistic development (i.e., social, cognitive, affective, and motor development; Zwicker et al., 2013; Leonard & Hill, 2014; Libertus & Hauf, 2017). For example, successful development of motor competence may help protect against the negative associations of physical inactivity (e.g., obesi-

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ty and decline in health, fitness and athleticism; Burton et al., 2022) and promote better cognitive skills (Van der Fels et al., 2015), higher academic achievement (Rasberry et al., 2011), whilst reducing instances of social isolation and bullying (Lingham et al., 2012).

In physical education, teachers typically engage children in the motor skill learning process through verbal instructional approaches (e.g., instruction and feedback) (Meltzer, 2017). Verbal instruction and feedback are the most prevalent behaviours to influence motor skill performance and learning. For example, Partington and Cushion (2013) highlighted that instruction and feedback accounted for 53.42% of all coaching behaviour in elite soccer. Additionally, Simpson et al., (2024) reported that 56% of all verbal communications from physical education teachers where instruction and feedback directly related to motor skill learning. Despite the prevalence and importance of instructional behaviours, the quality and content of verbal instruction and feedback may be preventing optimal motor skill learning (e.g., Powell et al., 2021; Halperin et al., 2016). Additionally, the time available to physical education in schools is limited due to its progressive marginalisation in the curriculum in favour of more academic subjects (e.g., maths, science). (Bailey, 2018). Therefore, there is a necessity to maximise the effectiveness of physical education lessons. One such method is to optimise the quality and content of verbal instruction and feedback by underpinning physical education with sound theoretical support (Rudd et al., 2019). However, there appears to be a research-practitioner gap due to a disconnect between scientific research (i.e., theoretical underpinning) and practical application (i.e., what practitioners actually do). This is potentially due to the inaccessibility of scientific content by practitioners (Holt et al., 2017). Therefore, the aim of this commentary is to describe a method for application of a contemporary motor learning theory (i.e., OPTIMAL theory) to inform best practice of instructional behaviours, which may optimise children's holistic development within physical education (Wulf & Lewthwaite, 2016; 2021).

The Optimal Theory Of Motor Learning

A recent systematic review has highlighted that an external focus of attention, enhanced expectancies and autonomy support are potentially key factors to optimise children's motor learning (Simpson et al., 2020; Wulf & Lewthwaite, 2016; 2021). According to the OPTIMAL (Optimizing Performance Through Intrinsic Motivation and Attention for Learning) theory of motor learning, instructional behaviours and task manipulations which pro-

mote these OTPIMAL factors (in combination or independently), enable more desirable motor behaviour (i.e., greater success on motor tasks) and improve psychological characteristics (e.g., confidence and motivation) of the learner (for overview of the OPTIMAL theory see Wulf & Lewthwaite, 2016; 2021). Specifically, an external focus of attention on intended movement outcomes or effects has been shown to be effective at improving task success (e.g., scoring a basket) in a range of different sporting and motor tasks (Chua et al., 2021). An external focus is effective to motor learning as it better allows for the self-organisation of the motor system without interference from conscious control (i.e., actively trying to co-ordinate movements – internal focus of attention), which can lead to sub-optimal performance (Chua et al., 2021). From a motivational perspective, instructional behaviours which increase expectations for success and reward (i.e., enhanced expectancies) improve motor learning by increasing intrinsic motivation (Bacelar et al., 2022). For instance, providing knowledge of results after positive practice attempts (e.g., Chiviacowsky et al., 2019), lowering perceptions of task difficulty (e.g., Bahrami et al., 2022), and enhancing conceptions of ability (e.g., Harter et al., 2019) have demonstrated to be effective methods to enhance expectations and improve motor learning, performance and motivation. Additionally, supporting a learner's basic psychological need for autonomy through providing opportunity for choice (e.g., order of tasks or equipment colour; Chua et al., 2020), or supportive instructional language (compared to more controlling language; Hooyman et al., 2014) can increase a learner's intrinsic motivation and enhance motor learning through direct (i.e., increasing task-relevant attention) and indirect (i.e., via enhanced expectancies) pathways (Simpson et al., 2024; Legault & Inzlicht, 2013; Grand et al., 2015; Grand et al., 2017).

According to OPTIMAL theory, instructional approaches which combine an external focus, enhanced expectancies and autonomy support factors better help learners couple their goals with their intended actions. For instance, '*your long jump is getting better every time* (enhanced expectancies), *try to approach the board as fast as possible and bounce off it* (external focus), *if you wanted to increase your run up this could help you get more speed on your approach* (autonomy support)' encompass all three OPTIMAL factors. It is proposed that goals are more intertwined with their intended actions, due to dopaminergic responses associated with reward (i.e., successful performance), which in turn contributes to improved functional connectivity across neural network regions including the efficient switching from the default mode to task-related brain networks. This process readies the motor system for task execution and helps to consolidate motor memories (Li et al., 2015). In sum, when present, these OPTIMAL factors trigger a virtuous

cycle for motor learning by increasing opportunities to experience success, leading to improved motivation and future expectations, which benefits future performances (Abdollahipour et al., 2017; Simpson et al., 2020a; 2020b 2024) (figure 1). In contrast, when these OPTIMAL factors are absent there is less opportunity to experience success potentially leading to a vicious cycle which hinders motor learning.

However, it should be noted that some research has challenged the tenets of OPTIMAL theory (McKay et al., 2023; McKay, et al., 2024). Specifically, Mckay et al., (2024) highlighted that reporting bias may be accentuating the superiority of an external focus over an internal focus of attention (i.e., a focus on bodily movements) in the motor skill learning literature. Mckay and colleagues (2024) suggest that a learner's focus of attention (i.e., internally or externally) may have variable effects depending on the skill learning context. For example, Gottwald et al., (2023) suggest that an internal focus may be more effective in situations where proprioceptive information is critical for task success (e.g., gymnastics; dance) and where an external focus may direct the learner's attention to less-optimal-task information. Indeed, the OPTIMAL theory's central mechanism is "goal-action coupling" where an internal focus may be more effective in facilitating the coupling of actions with intended goals (i.e., where proprioceptive information is critical) (Gottwald et al., 2023; Gottwald et al., 2020). Additionally, Mckay et al., (2023) indicated that studies examining enhanced expectancies and self-controlled practice (autonomy support) are underpowered and that reporting bias may have inflated the positive effects of these motivational factors on motor performance and learning. However, Parma et al., (2024) reported that learning was more likely to occur when motivation was increased after exposure to enhanced expectancies and autonomy support conditions (but evidence is limited). Despite the potential limitations within OPTIMAL theory research, the importance of attention and motivation for skill learning cannot be understated, particularly for a child's holistic development (Whitehead, 2019). Therefore, combining OPTIMAL factors through verbal instruction and feedback has appears useful to improve children's learning and motivational in physical education (e.g., Abdollahipour et al., 2017; Simpson et al., 2020a; 2020b; 2024; Wulf et al., 2014).

Therefore, using the OPTIMAL theory as a framework to underpin verbal instruction and feedback in physical education may help to increase experiences of success, thereby increasing motor competence, leading to a positive spiral of engagement in physical activity (Stodden et al., 2008). Additionally, it is worth noting that this commentary is not intended to be critical of other theories and approaches to motor learning/development nor is

it positioned from a specific pedagogical approach (e.g., linear, and non-linear). Indeed, PE teachers may require a more nuanced approach that blend different theoretical perspectives depending on specific teaching contexts (Alali, et al., 2024). Instead, the aim of this commentary is to provide physical education teachers with a useful framework to optimise their verbal instructional behaviours and children's motor learning and competence within physical education. The following sections provide examples of how each OPTIMAL factor can be applied in physical education.

Applying An External Focus Of Attention

Directing attention externally to the intended movement outcome or effect (e.g., '*follow through with the* **bat** *after hitting the ball*') has been shown to improve both the performance outcome and characteristics of movement, relative to focusing internally on the body itself (e.g., '*follow through with your* **hands** *after hitting ball*') (Chua et al., 2021). Observational research (Simpson et al., 2024) highlights that physical education teachers do employ externally focused instruction and feedback in their current practice (Simpson et al., 2024). But consciously designing external focus cues prior to delivery could be an effective method to integrate such language more frequently into PE lessons. Additionally, reflecting on current instructions can highlight opportunities to optimise them. For example, in a basketball passing task, an internal focus instruction may be '*push through your fingers on release*' whereas the instruction could be optimised by changing the language to shift attention from the fingers to the ball; '*push through the ball on release*'. The alteration of merely a few words has shown to affect the individual's focus of attention, and thereby motor learning and performance (Chua et al., 2021; Yamada et al., 2020).

Winkleman (2020) proposed the 3D (description, direction, distance) cuing model to effectively create external focus cues. Specifically, description refers to how the movement should be completed (i.e., '*push*'); direction of the action refers to reference to the self or an implement (e.g., '*through [the ball]*'); lastly, distance refers to whether the focus is closer or further from the body (i.e., '*the ball*'). Applying Winkleman's (2020) framework could further optimise the previously developed instruction, for instance, '*push powerfully* [description] *through the ball towards your teammate* [direction and distance]'. Fine-tuning instructions throughout the task can then be used to emphasise certain aspects for a better movement outcome (i.e., focusing on pushing powerfully to increase the velocity of the pass; '*powerful pass*').

Externally focused instructions and feedback may prove to be effective when correcting specific movement errors or employed to direct learners to more task-relevant information (Chow et al., 2014). For example, in a basketball dribbling task the feedback '*try to get the bounce lower*' could allow the motor system to naturally self-organise into a more controlled and guarded dribbling technique. Moreover, a broader external focus cue can be used to set up the parameters for which the learner will be operating within, by highlighting task-relevant cues (Herrebrøden, 2023). For example, in a volleyball setting lesson, the instruction '*see how long you can keep the ball off the floor, just using the set shot*' emphasises the aim of the task (i.e., keep the ball off the floor using the set shot) and highlights the most task-relevant source of information (i.e., the ball and keeping it off the floor). Clear visual cues when designing tasks may optimise performance (Coker, 2016). Naturally, implements in the environment (e.g., benches, ropes, balls) provide an external focus, and have a strong congruence with the task outcome. For example, a trampoline naturally presents the opportunity to jump/bounce on, however, an external focus cue can be used to develop technique (i.e., jump height; *'explode towards the ceiling with each jump'*).

Environmental cues (in the absence of implements) can be used to help learners attune to information that may lead to opportunities for success. For instance, in a soccer passing task, where the teacher is trying to develop off-the-ball movement, an external focus cue could be used to highlight spaces to move into to receive a pass (e.g., *'focus on looking for space on the pitch, when you find the space, drive into the gap'*). In summary, an external focus can be used to highlight key information sources and refine movement patterns, which can lead to improved performance/learning. Table I provides examples of ways to implement an external focus in various PE tasks.

Nonetheless, whilst the use of external focus instructions and feedback is suggested to be more beneficial, it does not mean that an internal focus cannot be used (Carson & Collins, 2016). As highlighted previously, an internal focus may be more beneficial in coupling actions with intended goals (e.g., throwing a javelin as far as possible) in situations where information about bodily actions is more important to the task (Gottwald et al., 2023; Gottwald et al., 2020). For example, the external focus instruction to *'focus on throwing to javelin to the cone at the 20m mark'* gives the learner an understanding about the task goal with clear external visual cues. However, an internal focus that promotes the follow through of the arm may be equally beneficial in achieving the task goal (i.e., maximising the distance the javelin is thrown). In this way an internal focus may be useful in correcting errors to promote more biomechanically effective movement patterns (Davies et al.,

TABLE I
External Focus Of Attention: Examples For Physical Education

Sport Type	Task / Lesson	Practice And Training States	Instructional Behaviour	Feedback
Net and wall	Badminton	*Skills Practice:* Half-court badminton playing area. Shuttle feeds with racket from partner. Shuttle must be returned by an overhead clear. 5 points scored if the shuttle lands in the coned-out box at the back of the court.	'Focus on meeting the shuttle as high as possible with your racket in the in the air'.	'Try follow through with your racket, you want to loop the shuttle over your partner'.
	Tennis	*Technical Practice:* Half-court tennis playing area. Emphasis on fundamentals of overhead tennis serve and aiming to position the ball in the opposite service box.	'Focus on tossing the ball straight up towards the sky'. 'Then try focus on hitting the ball at the highest point possible with the centre of the racket'.	'To get better accuracy, try angle the strings to where you want the ball to go. This should help you drive the ball over the net with more control'.
Invasion	Hockey	*Possession game:* large playing area to encourage participants to perform a push pass. Possession game 4 attackers vs 2 defenders, aiming to make 5 passes within the playing area.	'Focus on keeping the ball in contact with the stick, then forcefully push the ball towards your teammate'.	'You need to make sure the flat side of your stick is facing towards your teammate pushing the ball off, to allow you to be more accurate'.
	Basketball	*Technical conditioned practice*: Playing area with cones. Area can change in size to enable different passes to emerge.	'Focus on pushing through the ball. Look for space within the playing area'.	'More height on the ball when attempting the bounce pass. You want to make it easy for your partner to receive the ball'.
	Rugby	*Skills Practice*: large playing area in width and length. 4 attackers vs 1 defender working on transitioning the ball with a lateral pass. Receivers to stay behind the ball carrier.	'Focus on shifting the ball across like a pendulum when passing to your teammate'. 'Receivers pretend there is an imaginary horizontal line going across from the ball carrier, try stay behind this line to be onside'.	'To be more accurate with the pass and stop the defender intercepting, face the ball towards the target'.
Striking and fielding	Cricket	*Skills Practice:* Practicing batting technique with a focus on hitting the ball with the middle of the bat.	'Focus on watching the ball all the way onto the bat.'	'Try to hit the ball with the middle of the bat and follow through to get more power and control.'
	Rounders	*Skills Practice:* Practicing hitting the ball pitched by a bowler.	'Focus on tracking the ball as it approaches you.'	'Try to swing the bat smoothly and aim to hit the ball with the middle of the bat for better control and distance.'

(*Continued*)

(*Continued*) - TABLE I

Sport Type	Task / Lesson	Practice And Training States	Instructional Behaviour	Feedback
Target	Dodgeball	*Skills Practice:* Practicing dodging and throwing balls in a game scenario	'Focus on quickly moving to open spaces to avoid being hit. When throwing, aim for a spot nice and low near your opponent and focus on hitting them.'	'Try to focus on the trajectory and angle of the ball you are throwing to help you hit the target'
	Golf	*Skills Practice:* Practicing putting on a green with various distances to the hole.	'Focus on aiming the putter face directly at the hole.'	'Try to focus on the line you want the ball to follow into the hole for a smooth stroke'
	Athletics	**Track** *Technical Practice:* Sprinting drills on a 100m running track. Aiming to improve technique in the start, acceleration, and drive phases of the sprint.	'Focus on pushing the ground away at the start, then stay long and low during the acceleration phase'.	'Make sure that when you are in the drive phase you explode upwards towards the sky'.
		Field *Technical Practice:* Throwing drill in javelin, learning how to generate height and landing the javelin tip first.	'Focus on pulling the javelin all the way through until you can no longer see it'.	'Remember not to push the javelin, you want to pull it to get more distance'.
			'Focus on the height of the pointy tip. Not too high in the sky and not too low towards the ground'.	'Pretend you are trying to throw the javelin over a very tall fence in the distance'.
	Gymnastics	*Technical practice*: Practicing controlled jumps with half-turn off a bench with a controlled landing.	'Focus on facing the opposite wall when in the air. Try staying glued to the floor when landing and remain straight like a pencil'.	'You need to focus on pushing against the bench as rapidly as possible then bounce off it. This will give you more time in the air to complete your turn'.

2023). Additionally, an internal focus may help the learner grasp the movement/skill being learned or more explicitly direct them towards a movement pattern that better facilitates successful performance. This thereby may be useful when motor competence is low and early success/improvements engage the learner in the task, thereby increasing their opportunities to experience success and resultantly their motivation and learning (i.e., a virtuous cycle of learning). Moreover, some externally focused instructions may lack clarity/be too vague thereby not promoting relevant task information and diminish learning. For example, '*driving the ball upwards powerfully*' provides more task-relevant information than '*focus on the ball*' despite both being externally focused instruction. In this case an internal focus instruction *'focus on driving the hand forward powerfully"* will likely be more effective than the external focus instruction *'focus on the ball'.* Therefore, instructions that are clear, comprehendible and best represent the desired movement/effect (i.e., using an internal or external focus) may be most optimal in aiding goal-action coupling. Considering this, PE teachers should be pragmatic with their use of instructions given the contextual knowledge of the group of learner's skill level and task.

Applying Enhanced Expectancies And Autonomy Support

As highlighted previously enhanced expectancies and autonomy support are key motivational tenants of the OPTIMAL theory. Enhanced expectancy manipulations lead learners to believe that there is a high chance of success and are more likely to experience rewarding situations (i.e., task success) (Bacelar et al., 2022). Additionally, when learners are allowed to make choices during skill practice or instructional language is supportive, they feel a greater sense of control over their behaviours (Grand et al., 2017). When skill practice conditions enhance expectancies and support autonomy, intrinsic motivation is increased improving effective goal-action coupling and motor learning (figure 1) (Wulf & Lewthwaite 2016; 2021). The following section highlights examples of how enhanced expectancies and autonomy support could be applied in physical education.

An accessible method to a enhance a learner's expectancies for success is by providing positive feedback after successful performance (e.g., '*great pass!*'), as opposed to negative feedback on unsuccessful performance (e.g., *'No, you need to get more height on the jump'*). Feedback after good attempts-only has been shown to consolidate skill learning (Saemi et al., 2011) and likely mitigate de-motivating thoughts from failures, enabling future task engagement. Nev-

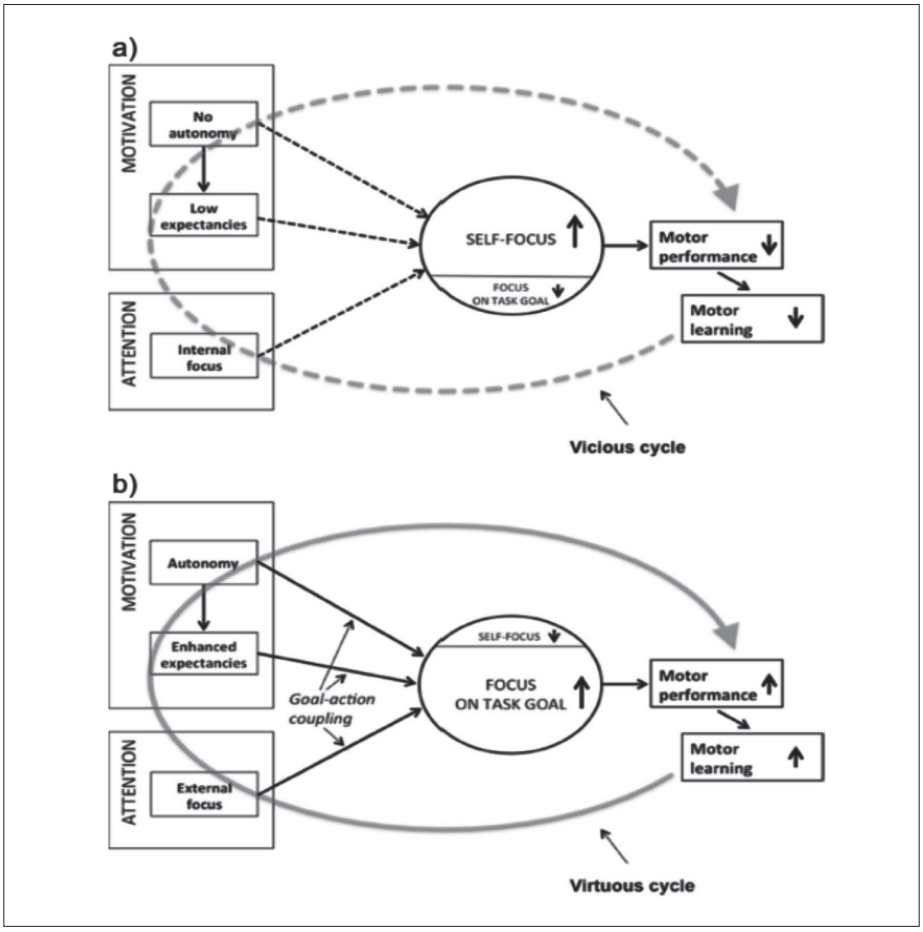

Figure 1. - The vicious (a) and virtuous cycles (b) of OPTIMAL Theory (Wulf & Lewthwaite, 2016, p1405).

ertheless, despite only focusing on positive elements of performance, students will experience failure during PE. Therefore, use of instruction and feedback that establishes a growth mindset (i.e., framing errors as positive in the learning process) and continuous development will help protect intrinsic motivation/ increase task effort (Chiviacowsky & Drews, 2014). For example, PE teachers can positively frame a learner's conceptions of ability, essentially making them believe that successful performance is achieved through high effort, regardless of their perceived ability (Chiviacowsky & Drews, 2014). For example, feed-

back statements such as, '*those free kicks were very good, it's clear you have been working hard*' demonstrates to the learner that successful performance is attainable with practice and effort, and not due to inherent ability (Harter et al., 2019). Then, when failure does occur this positive developmental feedback promotes a positive mindset that helps to protect motivation and increase task engagement (i.e., continued motivation to practice (Simpson et al., 2020b; Goncalves et al., 2018).

Beyond feedback, expectations can be enhanced through session designing and pre-task instruction. However, it is important to consider that the concept of success with challenge (Wulf & Lewthwaite, 2016; 2021) is critical to reap the benefits of enhanced expectancies. In essence, too little challenge on a task and learning is less likely to occur, however, too much challenge (i.e., without experiences of success) can be de-motivating for the learner and decrease task-engagement (Hodges & Lohse, 2022). The challenge point hypothesis suggests that there is an optimal challenge point where learning is most likely to occur but at the expense of short-term performances. This optimal challenge point is an interaction between the nominal difficulty of the task and skill level/competency of the learner (an interaction termed functional task difficulty) (Guadagnoli & Lee, 2004; Hodges & Lohse, 2022). For example, learning to perform a cartwheel is more difficult than throwing a javelin per se because it requires greater cognitive effort to coordinate the action. However, learners with greater motor competence (particularly in gymnastic skills) will perceive the cartwheel as easier compared to learners with poorer motor competence (Guadagnoli & Lee, 2004). (i.e., an individual's perception of difficulty for the task). Therefore, the optimal challenge point is different for each individual and requires physical education teachers to monitor and adjust challenge to ensure an appropriate/optimal difficulty level. However, the optimal challenge point may lead to poorer immediate performance (but better long term-learning) which may undermine intrinsic motivation. Yet, balancing challenge, motivation, and success can be achieved through careful pre-consideration (i.e., lesson planning) of how to enhance expectations.

Firstly, expectations can be enhanced through the setting of a clear and achievable performance criteria (Marchant et al., 2019). For example, in a volleyball setting task, an achievable criterion may be to complete five continuous set shots with a partner/group without the ball hitting the floor. The setting of clear goals can help focus a learner's attention to the task and helps them to develop their intrinsic feedback, and potentially, facilitate their exploration of more appropriate movements. Where success is not achieved, appropriate positive growth-mindset feedback should be provided to en-

courage continuous development (Chiviacowsky & Drews, 2014). Additionally, seeking opportunities for setting various challenges and opportunities for progression/regression should be considered. For example, a basketball dribbling lesson could be structured to progressively increase challenge throughout the lesson/task (i.e., dribble to a cone and back, dribble to cone with cross-over, dribble past an opponent) or to simplify game-based tasks (i.e., lowering the net in badminton to encourage longer rallies). Here the teacher can provide autonomy support by allowing learners to control the pace of progression (and regression if required) by allowing them to change aspects of the environment (e.g., increase and decrease net height, change of court dimensions) to manage their own challenge point (Moskowitz et al., 2020). Instruction and feedback can be used to place additional value on more challenging tasks or bias learners towards more relevant task-information (i.e., an external focus) through autonomy supportive language (i.e., that is suggestive rather than controlling; e.g., '*you might want to think about pushing harder to make sure the pass reaches your teammate'*) and positive mindset setting (i.e., framing good performance through effort exertion rather than ability level). Thereby, pre-task instructions can include all 3 OPTIMAL factors (external focus, enhanced expectancies and autonomy support) and reap the additive benefits of combing these factors including improved motor learning, increased motivation/confidence and persistence through adversity (Simpson et al., 2024; Chua et al., 2020). For example:

On the next task, you choose the challenge. You might want to dribble to the cone and back, you might want to switch the ball between your hands as your dribble, or you might want to try and perform a crossover through your legs. You choose the challenge, if you put the effort in, you can achieve the last two challenges. Here are some top hints for when you are dribbling, you might want to use these hints to help you improve your skills. As you are dribbling, focus on keeping the ball at a consistent height that will help you maintain control of the ball.

Of course, the teacher must play a critical role in ensuring any choice of challenge is developmentally appropriate, as children will consciously select tasks that bring them success to protect social worth (White et al., 2021), and consequently, may make choices that do not facilitate optimal learning (Ziv & Lidor, 2021).

In addition to choice over challenge, teachers can offer choices to learners such as, frequency of demonstrations (i.e., letting the child ask for demonstrations when they think they need it) (van Maarseeven et al., 2018), frequency of feedback (i.e., the teacher only provides feedback when asked for) (Carter & Ste-Marie, 2017) and on incidental elements (e.g., bib and ball

TABLE II.
Enhanced Expectancies: Examples for Physical Education

Sport Type	Task / Lesson	Practice and Training States	Instructional Behaviour	Feedback
Net and Wall	Volleyball	*Technical Conditioned Practice*: Students to perform overhand serve over full-size net into the coned-out areas. For this, the coned-out areas will range from large, medium and small in size, to provide a suitable challenge point for all.	**Task Difficulty for Success and Challenge:** 'Maybe to start, focus on getting the ball over and into the large area first'. 'Once you have been successful try and aim the ball into the smaller targets, if you feel comfortable'.	**Highlighting Positive Performances:** 'The second serve you did then was perfect, great height and contact with the ball, let's aim to repeat that'.
	Badminton	*Technical Practice:* Working on the short serve in badminton, using the flick serve technique. Participants must serve the shuttle over the net and into the large hoop in the opposite service box. Following this, if too easy, change the size of the hoop and/or serve against their partner trying to get the shuttle over the net and into the service box.	**Performance Malleable with Practice:** 'You have been practicing hard with those serves, I can tell, you are getting more accurate, well done'.	**Highlighting Positive Performances:** 'See how low your shuttle got to the net in your serve, that makes it difficult for the opponent to return, great shot, produce more of those serves'.
Invasion	Basketball	*Technical Skills:* Lay-up drill, 4 Students with a ball, in a line on the right side of three-point line. 4 students without a ball, in a line on the left side of the three-point line. One at a time participants must dribble the ball a few meters in and then transition into a lay-up, aiming to get the ball into the basket. On the opposite side without the ball, participants must run in one at a time to get the rebound if the ball misses the basket.	**Enhancing Conceptions of Ability:** 'I was very impressed with you practising your lay-ups last week, would you be able to provide us with a few of demonstrations?' **Highlighting Positive Performances:** 'Great work, the last one was spot on good height generated off the floor and reaching into the basket, keep doing that going forward'.	**Performance Malleable with Practice:** 'Those lay-ups just keep getting better and better, it is clear you have been practicing and working hard, well done'.
	Netball	*Phase of Play:* Attack vs Defence on half a pitch. Overload in attack with 7 players vs 4 defenders. The objective of the attacking team, passing and moving into space to break through the defensive line and score. For the defending team focus on keeping a defensive line and marking the space rather than the players due to the attacking overload. Defensive team must intercept the ball or kick it out of play.	**Task Difficulty for Success and Challenge:** 'Before we limit the number of touches on the ball, you can have as many as you want, just so you get used to the drill'. 'Right, now we are going to put an extra defender in to make it more challenging for the attacking team'.	**Positive Comparative Feedback:** 'As a group, that is some of the best build up play I have seen in this year group, it is clear you are putting in a lot of effort'. 'Defence, your communication skills with each other are the best I have seen in my lessons today, let's keep it up'.

(*Continued*)

(*Continued*) - TABLE II

Sport Type	Task / Lesson	Practice and Training States	Instructional Behaviour	Feedback
Target	Archery	*Skills Practice:* Practicing aiming and shooting arrows at a target	**Task Difficulty for Success and Challenge:** "Start by aiming for the larger target area. Once you feel confident, try aiming for the smaller, more challenging targets."	**Highlighting Positive Performances:** "Great shot! Your aim is improving, keep focusing on the center of the target."
	Bowling	*Skills Practice:* Practicing rolling a bowling ball to knock down pins.	**Task Difficulty for Success and Challenge:** 'Focus on hitting the pins in the center. Once you get the hang of it, try and get more pins down until you get a strike'	**Highlighting Positive Performances:** 'Excellent roll! You knocked down most of the pins, keep up the good work.'
Striking and fielding	Softball	*Skills Practice:* Developing striking of the ball	**Enhancing Conceptions of Ability:** 'Your batting technique has really improved, you get excellent contact on the ball, this week you work on hitting the ball in the direction you want'	**Positive Modelling:** 'Your batting has been excellent all lesson, would like to demonstrate to the rest of the class'
	Cricket	*Skills Practice:* Practicing fielding techniques, such as catching and throwing.	**Task Difficulty for Success and Challenge:** 'See how may catches you can take in row. If you make a catch, you and your partner, take a step back. If you drop the ball, you both take a step in. Remember that a good throw will make the ball easier to catch.	**Performance Malleable with Practice:** **"**Your fielding skills are improving with each practice. Keep focusing on your technique and you'll see even more progress."
	Gymnastics:	*Technical Skills*: Partner balances working on tension, extension and control. Pairs must create three partner balances, transitioning in and out of the balances with a range of different rolls and jumps.	**Enhancing Conceptions of Ability:** 'Your individual routine last week was delivered with a great level of execution, now I want you to use that alongside your communication skills, working in a pair'.	**Positive Modelling:** 'If you look at the last few of your balances we recorded on the iPad, you can see how controlled and still you are, keep doing that going forward'. 'Perfect demonstration to the class, look how they almost bounced off the floor and quickly pushed off to generate a lot of height in their jump'.

TABLE III
Autonomy Support: Examples For Physical Education

Sport type	Task / Lesson	Practice and Training States	Instructional Behaviour	Feedback
Invasion	Football	*Small-Sided Conditioned Game*: 7 vs 7 game with conditioned rules, to improve quick passes and moving into space.	**Providing Choice:** 'Please can I have two volunteers from each team to be captains/leaders for their team'. 'Ok, captains would you like to organise your teams into position and choose the formation?'	**Empowering Questions and Suggestions:** 'Great work getting everyone organised, now could you think of a rule we could put in place to get everyone more involved?'. Participant Suggestions: Everyone must touch the ball before the team can score; make at least 5-passes; allow the team to try out new positions; only 3-touches are allowed.
	Hockey	*Small-Sided Conditioned Game:* 7 vs 7 conditioned game, working on switching the ball and using the width of the area. Channels are created with cones on either side (one for each team), which run the full length of the pitch. A winger is the only player allowed in the channel and can use this area unopposed.	**Providing Choice:** 'It is up to you to choose which player goes in the channel; you are able to switch this at any point throughout the game'. **Providing Meaningful Rationales:** 'I have chosen for us to do this activity as I think putting a winger in a zone will allow us to focus on spreading the ball more, which will help us create more space in possession'.	**Providing Meaningful Rationales:** 'You are all doing a fantastic job of using the channels effectively, I am thinking of now taking them out. Do you think we are able to spread the ball across the pitch without them in place… what are your thoughts?'
Striking and Fielding	Cricket:	**Drill 1:** *Technical practice*: Fielding practice with a partner. The pair needs to be around 10-15m apart. One person performs a forceful underarm feed along the floor, the other person fields the ball using the long-barrier technique. **Drill 2:** *Functional Practice:* This drill should be a natural progression from drill 1, introducing elements of competition. Three wide gates are positioned in the field around 10-15m away from the feeder, the other person has to defend these targets by stopping the ball from going through them, employing the long-barrier technique.	**Providing Choice:** 'It is completely up to you on how many times you want to practice the first drill, as long as you are comfortable with the technique'. 'You can choose which drill you want to start on, the second drill might give you more of a challenge if you feel comfortable with the technique'.	**Control Over Practice:** 'Your technique is clearly something you have been working on, now I want you to think how you can make the drill a little more challenging for you'.

(*Continued*)

(*Continued*) - TABLE III

Sport type	Task / Lesson	Practice and Training States	Instructional Behaviour	Feedback
Net and wall	Volleyball	**Technical Practice:** Practicing different types of serves (overhand, underhand) and their accuracy.	**Control over practice:** 'In your groups, I want you to come up with a goal as to how long you can keep the rally going. You decide whether you want to start with the overhand or underhand serve first.	**Empowering Questions and Suggestions:** 'Great work getting everyone on developing the serving skills, now could you think of a rule we could add to improve accuracy?' Participant Suggestions: Everyone must stay in their own zone and cannot touch the ball outside their zone.
	Badminton	*Technical Practice:* Practicing various shots (smash, drop, clear) and their accuracy.	**Control over practice:** 'I am going to let you choose whether or not you want to use the net and what height you want the net. Remember that you want to keep the challenge at the right level for you'	**Using Supportive Language:** 'You have shown excellent progress today. You may want to focus on extending the racket more quickly to make the smash even more powerful.'
Target	Dodgeball	*Skills Practice:* Practicing dodging and throwing techniques in a game scenario.	**Providing Choice: '**In your small groups, you can choose whether to focus on dodging or throwing first. Once you feel confident, switch to the other skill.'	**Control Over Practice: '**Set personal goals for how many successful dodges or hits you want to achieve in the next five minutes. Let me know if you need any advice on improving your technique.'
	Gymnastics	*Technical Skills:* Creating a gymnastics sequence in pairs, incorporating balances, transitions and jumps.	**Providing Choice:** 'I am going to give you the chance to choose the partner you would like to work with'. 'Now you have the responsibility to create and execute a routine, you need to consider including a range of balances, transitions and jumps'.	**Using Supportive Language:** 'Fantastic routine, to make the jumps even better, you may want to push against the ground more rapidly, which might give you more height to execute your turn'.
	Athletics	**Field** *Technical Practice:* Throwing drill in discuss aiming on developing the correct technique and gaining distance.	**Providing Choice:** 'After you have had a few practice trials, feel free to place a cone down to the distance you want to try and beat for your personal best'.	**Control Over Practice:** 'I know it can be a difficult technique to grasp, let me know if you want me to give you another demonstration, or ask if you want any specific feedback on anything'.

colour, choice of practice partner). Research has demonstrated that allowing children choices during skill practice leads to enhanced motor learning and intrinsic motivation potentially impacting longer-term engagement in physical activity (and skill practice) (Simpson et al., 2020a). Again, physical education teachers' knowledge of their student's competencies and behaviours is required to allow appropriate choices for learning (Simpson et al., 2020a). Additionally, supportive language could be integrated with such instruction and feedback to guide learners towards successful actions and help them to seek a greater challenge point. For example, feedback statements such as '*fantastic gymnastic routine, now* **you might** *consider more difficult balances to show me your skills*', steers away from controlling terminology which can be prescriptive in nature (e.g., '**you must** bend your legs more to generate power') and allows the learner to consciously think of alternative ways to demonstrate their capabilities. Finally, providing meaningful rationales for decisions, instruction or feedback made/provided by the teacher (e.g., '*Bending your legs more will help to generate more power on the ball, this will help you to get it over the net and give you a better chance at scoring a point')* and considering student's feelings, opinions and perspectives (e.g., allowing suggestions to be offered, supporting group discussions and questioning) can support autonomy (Su & Reeve, 2011). Overall, enhancing expectancies and providing autonomy support in PE lessons will improve a learner's confidence, intrinsic motivation and motor learning, having holistic benefits on the students' development. Table II & III provide examples of methods to implement enhanced expectations and autonomy support in various PE tasks/scenarios.

Summary

This paper presents examples of how to integrate an external focus, enhanced expectancies, and autonomy support factors into physical education lessons through instructions and feedback. This is not an exhaustive overview of how the factors can be applied, nor does it account for the range of factors influencing motor learning. Instead, it is intended to provide PE teachers with a useful framework to help optimise the learning of motor skills to develop motor competence and improve intrinsic motivation. Ultimately to increase physical activity levels throughout the lifespan and encourage more holistic development. The challenges faced by teachers (i.e., class sizes, equipment availability, time-constraints, behaviour management and level of competency delivering PE) will ultimately define how these factors are used in practice.

Acknowledging that there is not always opportunity to 'optimise' learning, and that there is not a one-size fits all approach will help physical education teachers to slowly implement these factors into their PE lessons. Nevertheless, the examples provided in this paper show how each factor can be applied but also highlights the integration of OPTIMAL factors through combined instructional approaches and implicit task design. We are not suggesting that without these factors learning will not occur, or that all instruction and feedback should combine these factors. Instead, performance, learning and motivation will be optimised as compared to when these attentional and motivational factors are absent from skill practice, and ultimately facilitate young people to become more active, healthier and motor competent.

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