An analysis of practice activities and instructional behaviours used by youth soccer coaches during practice: Exploring the link between science and application

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INTRODUCTION

In recent years there has been much progress in extending our understanding of the science of skill learning and the types of practice activities and instructional behaviours that best develop expert athletes (Farrow, Baker, & McMahon, 2008; Williams & Hodges, 2004, 2005). However, few published reports have focused on how or whether coaches *apply* these scientific principles in their practices and behaviours.

In this paper, we examine what coaches actually do during practice and whether their behaviours differ from those that contemporary researchers have shown to be optimal for skill acquisition. We also investigate the extent to which coaches alter their practice activities and behaviours as a function of the age and skill of players.

We investigated the practice activities and instructional behaviours employed by 25 youth soccer coaches in England over 70 different practice sessions. The coaches worked with each of three age categories (under-9, under-13, and under-16 years) and three skill levels (elite, sub-elite, and non-elite). We systematically observed these practice sessions and coded practice activities into two broad categories, namely ''training form'' (i.e. physical training, technique and skills practices) and ''playing form'' (i.e. phase of play, small-sided/ conditioned games). Four different instructional behaviours were coded: instruction; support and encouragement; prolonged silence; and management.

RESULTS

Altogether, 25 coaches took part in this study from eight soccer clubs. The nine coaches of under-9 players and all held the UEFA B Coaching Licence, apart from one who was undertaking that licence and two who held the UEFA A Coaching Licence. The eight coaches of under-13 players all held the UEFA B Coaching Licence, apart from one who was undertaking that licence and four who held or were undertaking the UEFA A Coaching Licence. The eight coaches of under-16 players all held the UEFA B Coaching Licence, apart from four who held or were undertaking the UEFA A Coaching Licence.

In terms of the skill of the players, nine of those coaches (elite group) were working in the Youth Academy of three professional English Premier League clubs. Nine of the coaches (sub-elite group) were working in the Centre of Excellence of three professional English Football League clubs. Seven of the coaches (non-elite group) worked at two amateur and semi-professional clubs that had achieved The FA ''Charter Standard''.

The coaching sessions took place at each club's training ground. At each club, we filmed three practice sessions for the coach working with the under-9, under-13, and under-16 years

age group respectively. The video footage of each coaching session was transferred to DVD and analysed. An investigator notated the start and end time of each activity on the hand-notation sheet (see Table 1). When a predefined coaching behaviour was first exhibited by the coach during practice, the investigator recorded the assigned coaching behaviour number (see Table II).

Table I. Categories and definitions of soccer activities.

Activity	Definition
Training form	
Fitness	Improving fitness aspects of the game without a ball (e.g. warm up, cool down, conditioning, rest)
Technical	Isolated technical skills unopposed alone or in a group
Skills	Re-enacting isolated simulated game incidents with or without focus on particular technical skills
Playing form	
Small-sided games	Match-play with reduced number of players and two goals
Conditional games	As small-sided games, but with variations to rules, goals or areas of play (e.g. possession/ball retention only games, or teams scoring by dribbling ball across end-line)
Phase of play	Uni-directional match-play towards one goal

Table II. Coaching behaviour categories and definitions.

Behaviour	**Definition**
Instruction	
Pre-instruction	Initial information given to a player(s) preceding the desired action to be executed. Used to explain how to execute a skill, play, assignment, strategy, and so forth
Concurrent instruction	Cues or reminders given to a player(s) during the actual execution of the skill or play
Post-instruction	Correction, re-explanation or instructional feedback given after the execution of a skill or play
Questioning	Any question to a player(s) concerning strategies, techniques, assignments, and so forth
Modelling	Provision of a demonstration of correct or incorrect performance of a skill or playing technique.
Support and encouragement	
Scold	Verbal or non-verbal compliments, statements or signs of acceptance expressed towards the player(s)
Praise	Verbal or non-verbal compliments, statements or signs of displeasure expressed towards the player(s)
Hustle	Verbal or non-verbal statements intended to intensify the efforts of the player(s)
Silence	Deliberate period of time when the coach is not talking. Deliberate period constitutes a period of silence for 5 s
Management	Verbal statements related to the organizational details of practice sessions, not referring to strategies or skills
Uncoded	Any behaviour that cannot be seen or heard or does not fit into the above categories

Session duration
The average session duration was 78min. There was a significant difference between skill groups. Session duration was significantly longer for the elite (89min) and sub-elite (83min) groups than the non-elite group (59min).

Time-use analyses
Figure 1 shows the percentage of session duration spent in training form and playing form activities as a function of age and skill.
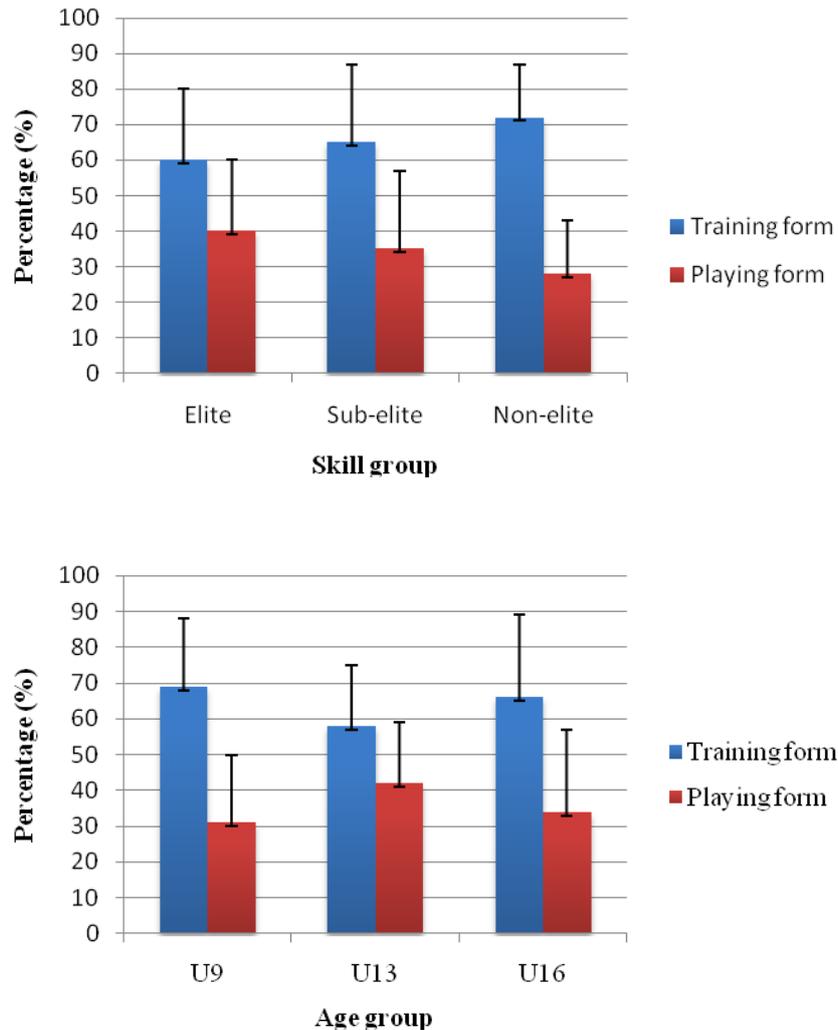

Figure 1. Percentage of session duration spent in training form activities (fitness activity, technique practice, and skills practice) and playing form activities (phase of play activity, small-sided/ conditioned games) as a function of (a) age and (b) skill.

Training form activity
All teams took part in each of the three training form activities: fitness activity, technique practice, and skills practice. Percentage of session time spent in fitness activity was 29% for the elite teams, 23% for the sub-elite teams, and 19% for the non-elite teams. Percentage of session time spent in technique practice was 21% for the elite teams, 25% for the sub-elite teams, and 36% for the non-elite teams. Regardless of age, percentage of session time spent in skills practice was 14%, whereas percentages of session time spent in fitness activity and technique practice were both 25%.

Playing form activity

Four sessions contained no playing form activity (one elite, under-16; one elite, under-9; two sub-elite, under-16). With some exceptions, all skill and age groups took part in each of the three playing form activities: phase of play activity, conditioned games, and small-sided games. Phase of play activity was not engaged in by all under-9, under-13 sub-elite, and under-16 non-elite teams. Conditioned games were not engaged in by the under-9 non-elite teams. Percentage of session time spent in conditioned games was 24% for the elite teams, 11% for the sub-elite teams, and 9% for the non-elite teams. Percentage of session time spent in small-sided games was 13% for the elite teams, and 18% for both the sub-elite and non-elite teams. Percentage of session time spent in small-sided games was 15%, 20%, and 13% for the under-9, under-13, and under-16 team, respectively. Percentage of session time spent in conditioned games was 15%, 18%, and 13% for the under-9, under-13, and under-16 team, respectively.

Coaching behaviours
Table III shows the frequency, rate per minute, percentage of all coaching behaviours, and time intervals of the coaching behaviour categories as a function of skill and age across the two activity forms.

Table III. Frequency, rate per minute (RPM), percentage of total behaviours, and intervals for the coaching behaviours (instruction, support and encouragement, management, prolonged silence) as a function of activity, skill, and age (mean±s).

Table III. Frequency, rate per minute (RPM), percentage of total behaviours, and intervals for the coaching behaviours (instruction, support and encouragement, management, prolonged silence) as a function of activity, skill, and age (mean ± s).

	Instruction				Support and encouragement				Management				Prolonged silence			
	Freq.	RPM	%	Interval	Freq.	RPM	%	Interval	Freq.	RPM	%	Interval	Freq.	RPM	%	Interval
Training form (Skill)																
Elite	139 ± 79	1.57	31 ± 9	170 ± 94	154 ± 110	1.70	34 ± 14	204 ± 150	95 ± 68	1.06	21 ± 7	128 ± 72	44 ± 24	0.61	11 ± 6	73 ± 59
Sub-elite	136 ± 94	1.60	31 ± 11	150 ± 101	105 ± 110	1.24	24 ± 11	125 ± 122	104 ± 64	1.23	26 ± 8	120 ± 75	45 ± 36	0.81	17 ± 14	77 ± 50
Non-elite	114 ± 59	1.89	26 ± 6	110 ± 69	104 ± 60	1.73	24 ± 7	119 ± 84	99 ± 53	1.65	25 ± 10	103 ± 45	90 ± 61	1.47	20 ± 6	103 ± 56
Training form (Age)																
Under-9	157 ± 82	2.04	36 ± 8	145 ± 94	113 ± 75	1.54	25 ± 10	113 ± 75	104 ± 50	1.39	25 ± 9	125 ± 60	44 ± 24	0.62	11 ± 5	69 ± 40
Under-13	108 ± 80	1.29	28 ± 10	128 ± 100	123 ± 130	1.40	32 ± 15	123 ± 130	71 ± 49	0.88	22 ± 9	96 ± 68	45 ± 36	0.59	14 ± 8	79 ± 62
Under-16	132 ± 75	1.66	25 ± 8	171 ± 86	133 ± 95	1.64	25 ± 10	220 ± 149	125 ± 75	1.54	24 ± 6	136 ± 71	110 ± 72	1.45	22 ± 14	95 ± 60
Playing form (Skill)																
Elite	159 ± 78	1.78	24 ± 9	168 ± 92	174 ± 124	1.91	29 ± 12	163 ± 125	115 ± 58	1.28	21 ± 8	128 ± 68	103 ± 92	1.14	18 ± 12	112 ± 65
Sub-elite	119 ± 101	1.39	31 ± 11	118 ± 92	61 ± 46	0.76	18 ± 10	61 ± 46	71 ± 55	0.88	21 ± 10	69 ± 46	90 ± 89	1.11	26 ± 14	77 ± 39
Non-elite	72 ± 50	1.19	29 ± 10	67 ± 51	48 ± 31	0.83	20 ± 9	49 ± 32	44 ± 29	0.73	21 ± 8	48 ± 35	59 ± 39	0.97	28 ± 14	60 ± 39
Playing form (Age)																
Under-9	97 ± 78	1.25	30 ± 13	113 ± 94	82 ± 89	1.05	25 ± 12	82 ± 89	61 ± 47	0.79	24 ± 11	72 ± 54	34 ± 24	0.44	18 ± 14	69 ± 43
Under-13	128 ± 83	1.62	31 ± 7	149 ± 98	125 ± 125	1.55	26 ± 11	114 ± 121	74 ± 55	0.93	18 ± 7	98 ± 74	70 ± 34	0.91	20 ± 7	113 ± 62
Under-16	141 ± 100	1.03	26 ± 9	110 ± 79	87 ± 67	1.01	16 ± 8	87 ± 67	111 ± 62	1.31	21 ± 5	85 ± 55	168 ± 102	2.04	34 ± 13	75 ± 46

DISCUSSION

As predicted, the coaches had their players engage in more training form than playing form activities. On average across groups, 65% of practice time was spent in training form activities versus 35% in playing form activities. We deemed playing form activities to be more relevant to performance in soccer compared to training form activities. The finding that players only engage in more relevant activities (i.e. playing form activities) for around a third of total practice time is rather worrying. A conservative view would suggest that more practice time should be spent in playing form than training form activities, whereas a more radical view would be that only playing form activities should be employed (Williams & Hodges, 2005). Moreover, the links between perceptual, cognitive, and motor skills appear to be set to some degree in the early stages of development, so it is especially important that younger and novice players are exposed to playing form activities, which create the skills and links between the skills that they will need to perform in a match.

We also examined the nature of the coaching behaviours employed by coaches during the activities. The most frequently used coach behaviour was instruction, supporting previous systematic observation research in soccer (e.g. Cushion & Jones, 2001). Although the provision of instruction and management is an essential component of the coaching process, recent empirical work has highlighted the dangers involved in being overly prescriptive and in using these behaviours too frequently during practice (Davids et al., 2008; Williams & Hodges, 2005). At some stage, usually in competition, learners have to perform on their own without direct guidance and instruction from coaches. Consequently, the challenge for coaches is to provide the least amount of instruction possible so as to enable athletes to solve problems independently regardless of the athlete's age or skill.

Our findings illustrate the lag between research and its application in coaching and coach education (Farrow et al., 2008). Contemporary research in the areas of skill acquisition, motor learning, and expert performance highlight the advantage of using practice activities that are highly relevant to performance and that recreate the perceptual, cognitive, and motor demands of competition, coupled with a more ''hands-off'' approach to instruction. We would view this as more time spent in playing form activities and a lower frequency of instructional behaviours. In contrast, the data show that players spent the majority of their time engaging in less relevant training form activities that did not replicate particularly well the demands of competition, whereas at the same time the coaches spent most of their time providing explicit instruction and management. When acquiring and designing practice activities and instruction behaviours, coaches tend to rely on emulation of other coaches, their own intuition, and the traditions of the sport and club, rather than on evidence-based research findings (Williams & Hodges, 2005). Moreover, research from a sociological perspective (e.g. d'Arripe-Longueville, Fournier, & Dubois, 1998) has shown that the expectations of several parties (e.g. athletes, other coaches, managers, parents of athletes) and the context the coaching occurs in can cause the coach to behave in certain ways, which might not match scientific evidence showing what coaches should do in that context.

Practical implications

Our findings contradict those reported in contemporary research in the areas of skill acquisition, motor learning, and expert performance. In this study, players spent more time in activities that were deemed less relevant to soccer match performance (i.e. training form activities: physical training, technique practice, and skills practice) than activities deemed

more relevant (i.e. playing form activities: small-sided/conditioned games and phase of play activities). Coaches also provided high levels of instruction, management, and feedback, irrespective of the activity. Previous research has highlighted the advantage of using practice activities that are highly relevant to performance in that they recreate the perceptual, cognitive, and motor demands evident during competition, coupled with a less prescriptive approach to instruction. Training form activities are more likely to only train the motor skills of players, whereas successful match performance requires players to use perceptual, cognitive, and motor skills simultaneously during performance. It is possible to adapt training form activities so that they more realistically recreate the demands evident during competition, although this type of activity was not evident in our data. The key to this adaptation is that the activity requires that players make match-like decisions themselves based on the positioning and movements of opponents, team-mates and the ball, as well as the availability of space. Coach educators have a role to play in closing the gap between research and practice by disseminating through education courses up-to-date and applicable research findings from the areas of skill acquisition, motor learning, and expert performance.