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**DEVELOPING CRITICAL REFLECTION SKILLS IN A FORMAL COACH
EDUCATION PROGRAMME**

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Abstract

Alongside knowledge and understanding of the sport (what to coach) and strategies to support learning (how to coach), critical reflection is an important feature of high-quality coaching practice. Accordingly, there is a clear need for evidence-based tools and frameworks for appreciating and developing coaches' critical reflection skills, through coach education programmes. The purpose of this study is to share the results of an intervention intended to develop coaches' critical reflection skills through a formal gymnastics coach education programme within the Flemish School for Coach Education (Belgium). A pre-test-post-test design was used to compare the development of written critical reflection skills in 25 gymnastics coaches (14 intervention; 11 control). Statistical analysis of data revealed that the intervention had a significant ($p < .01$) impact on the quality of coaches' critical reflection. Coaches exhibited a positive, upward, trajectory from descriptive verbalizations to a deeper level of self-awareness and greater criticality, along with demonstrating a willingness to adopt alternative ideas/approaches. Findings are discussed in relation to existing research on critical reflection as a feature of coach education. This study offers a unique critical reflection strategy that has the potential to meet the learning development needs of coaches in a formal coach education programme.

Keywords: self-reflection, critical reflection, personal development plan, self-awareness, formal coach education

Developing critical reflection skills in a formal coach education programme

Sport coaches are expected to possess a wide range of competences and expertise in order to fulfil their roles effectively in different contexts and with different participant populations. In recent years, a variety of stakeholders from around the world have produced coaching frameworks as part of a professionalisation agenda (e.g., ICCE, 2013; Lara-Bercial et al., 2017; United States Olympic Committee, 2017). Within these frameworks, coach competences and expertise have been classified in different ways. Based on the work of Côté and Gilbert (2009), and Gilbert and Côté (2013), the International Sport Coaching Framework (ICCE, 2013) adopts the distinction made between (1) professional knowledge (i.e., about the sport, athletes, and coaching pedagogy); (2) interpersonal knowledge (i.e., about the social context of sport and relationships amongst participants and stakeholders); and (3) intrapersonal knowledge (i.e., about a coach's own beliefs, values, attitudes, and skills that shape and influence coaching practice) (ICCE, 2013).

Increasingly, formal coach education programmes are viewed as the dominant mechanism for supporting the professional development of sport coaches, and as a result are deemed important and valuable by sport coaching stakeholders (North et al., 2019). Most relevant to this study, research has illustrated that these programmes can also contribute to the development of coaches' professional, interpersonal, and intrapersonal knowledge, better equipping them to advance athlete performance (Piggott, 2012; Stodter & Cushion, 2019). Although each of these knowledge bases is important, the centrality of intrapersonal knowledge to effective and ethical coaching practice, plus the specific importance of reflection skills, is promoted by the International Council for Coaching Excellence (ICCE, 2013). Despite this, the vast majority of coach education programmes prioritise and privilege the development of coaches' professional knowledge (e.g., sport-specific knowledge) and interpersonal knowledge (e.g., social-relational aspects of coaching). Developing

intrapersonal knowledge is still somewhat overlooked in formal coach education programmes (Lefebvre et al., 2016).

One reason for this might be the lack of ‘space’ available in learning experiences that are driven by increasingly ‘stuffed’ curricula (Cousin, 2006) and lengthy sets of learning outcomes. For example, on the FA Level 3 (UEFA B) coaching football programme, designed for, and delivered to, both grassroots and performance football coaches in England, 64 intended learning outcomes are to be achieved through 18 workshops (McCarthy, 2022). According to Cornford (2002), the most significant barriers in addressing this lie in changing the attitudes of those designing and delivering educational programmes, in order to reduce the volume of subject matter content; thus, ensuring intrapersonal skills “are well practised and through practise, mastered” (p. 366).

Although not always embedded in the coach education curriculum, developing reflective skills is presently considered to be an essential aspect of coach learning (Gilbert & Trudel, 2006; Lyle & Cushion, 2010; Swettenham & Whitehead, 2021). In the context of coach education, a reflective approach to practice is now espoused as “a key tool for understanding and enhancing coach learning and raising the vocational standards of coaches” (Stoszkowski & Collins, 2014, p. 139). According to Nelson and Cushion (2006), reflection has the potential to provide “a bridge linking knowledge gained from professional experience, observations, coaching theory, and education” (p. 175). Moreover, the importance of reflection is captured by the witticism that “ten years of coaching without reflection is simply one year of coaching repeated ten times” (Gilbert & Trudel, 2006, p. 114). However, although the need for reflection is well-accepted, its meaning tends to shift to accommodate the interpretation and interests of those using the term ‘reflection’ (Downham & Cushion, 2020). For example, it is argued that deliberately engaging in reflection can promote critical thinking (Taylor et al., 2015), improve the quality of coaching practice (Blair, 2011; Whitehead et al.,

2016), develop leadership capability (Patterson, 2015), improve learning (Moon, 2006), and increase self-awareness (Gilbert & Côté, 2013; Swettenham & Whitehead, 2021). To attain these goals, both Gilbert and Trudel (2013) and Trudel and Gilbert (2013) identify two specific approaches to reflection that are highly relevant and practical for developing expertise in sport coaching: reflective practice and critical reflection. Reflective practice can be described as (present-focused) reflection-*in*-action or (delayed) reflection-*on*-action, both with the aim of improving athlete and coach outcomes. Critical reflection, on the other hand, refers to a deeper and more personal level of reflection. It requires coaches to ‘look beneath the surface’ and reflect on their own values, beliefs, coaching philosophy, strengths, deficiencies, and motivation, in order to question their thought processes, shift perspectives, and identify new ways of thinking (Trudel & Gilbert, 2013). According to Cushion and colleagues (2003) critical reflection can be seen as a tool to equip “coaches with a mirror in which they can see their own programs and practices” (p. 223). Critical reflection has the potential to provide a basis for emancipatory practice and empower coaches, allowing them to become more responsible for their actions (Stoszkowski & Collins, 2014; Thompson & Pascal, 2012).

When these approaches to reflection are compared to each other within the context of formal coach education, the focus seems to be predominantly placed on (guided) reflective practice as a tool for developing coaching practice (Kuklick et al. 2015; Trudel et al., 2020). This is despite the fact that several scholars, across the past two decades, have argued in favour of integrating critical reflection into formal coach education programmes (Cushion et al., 2003; Gilbert & Trudel, 2013; Knowles et al., 2006). While good progress has been made in offering practice-focused examples of how it might be done using a variety of approaches (e.g., Douglas & Carless, 2008; Stoszkowski et al., 2021), we recognise an opportunity to

further advance this work and offer evidence-based tools and instructional guidance for coaches, coach educators, and coach education programme developers.

Drawing on the existing set of ideas, ‘structured written reflection’ appears to be one tool that is used in coach education to enhance and assess critical reflection skills. This can take the form of reflective journaling (Moon, 2006), and web logs or blogging (McCarthy & Stoszowski, 2018; Yang, 2009). In a study by Stoszowski & Collins (2014), 26 full-time sports coaching undergraduate students reflected on their coaching practice through the mechanism of blogging. Although many of the students exhibited a positive trajectory toward higher order reflective capability, some students struggled to develop critical reflection skills. Consistent with other studies, the authors concluded that “the mere provision of a tool does not guarantee that those using it will automatically reflect at higher levels” (Stoszowski & Collins, 2014, p. 146). This is congruent with more recent, similar, work by Stoszowski et al. (2021). Moreover, similar conclusions were reached by Lew and Schmidt (2011), who posit: “extended experience alone, as our study has demonstrated, is clearly not enough to affect change [...] further research should investigate if students’ self-reflection skills can be improved through formal training” (p. 541). Referring to the work of Mann and colleagues (2007) and Jacobs and colleagues (2016), it can be concluded that, similar to other skills (e.g., learning-to-learn skills), learners need a structure to guide the complex process of critical reflection in their own learning experiences. Critical reflection is a skill that should be taught rather than assumed (Cropley et al., 2012; Gilbert & Trudel, 2006).

Research Context

The *Vlaamse Trainersschool* (VTS; Flemish School for Coach Education) is a cooperative association between the public government, sport federations, and universities/schools of higher education. VTS is responsible for developing, organising, and certifying coach education within the Flemish community of Belgium (Vangrunderbeek &

Ponnet, 2020). Each year 9,000 coaches follow one or more of the five-level coach education programmes in 50 different sports (Ponnet et al., 2021). Like in many coach education programmes, the world over, coaches are encouraged to reflect on their planning and practice as part of a process of ongoing improvement (ICCE, 2013).

Regarding critical reflection, the topic of this paper, a specific approach was adopted following a review of relevant research (e.g., Gilbert & Trudel, 2013) and stakeholder consultation (i.e., with subject experts and coach educators). Since 2020, 84 coach education programmes between levels three and five within VTS included a course titled ‘Personal Development Planning (PDP) for Sports Coaches’. At level 3, the amount of contact hours for the course is four, while at level 4 and 5 this increases to 10 hours. The main goal for this course was to identify and make coaches familiar with relevant concepts, while supporting the development of appropriate knowledge, understanding, and application in context. Within this course, the process of critical reflection was structured, encouraged, and promoted using the research-based model known as ‘Flemish Personal Development Planning’ (PDP, De Cuyper et al., 2012); this consists of four consecutive phases, including analysis, planning, action, and evaluation (see Figure 1). The intended outcomes are that coaches become increasingly skilled at critical reflection and as such, become *more* effective sport coaches.

Regarding the approach to assessing coaches on the PDP course, a learning-oriented strategy was adopted; that is to say, assessment was deliberately designed to influence and encourage learning (Carless, 2007). To demonstrate the development of critical reflection skills (and intrapersonal knowledge), coaches curated a portfolio throughout the full duration of the programme. Across the entire course, coaches were autonomous in selecting exercises, generating content, and designing and developing personalised action plans based on their individual needs within their unique coaching context. Coach developers operated as a ‘guide by the side’, encouraging coaches to be fully immersed and active in the learning opportunity.

This signifies a novel approach for VTS and represents a response to contemporary coach assessment research (McCarthy, 2022; McCarthy et al., 2021a; McCarthy et al., 2021b; Vangrunderbeek & Ponnet, 2019).

Methodology

The purpose of this paper is to investigate whether coaches develop better critical reflection skills when they are deliberately promoted through formal coach education. Following an examination of the reflective practice and critical reflection literature and issues with coach education, the present section will deal with research methodology, design, and method. This study encompasses an experimental, two group, pre- and post-test research design to examine gymnastics coaches' critical reflection skills before and after an intervention in a formal VTS level 3 coach education programme. Thus, we are seeking to establish causality through a positivist, data-driven, approach to research. The following sections describe the research process in more detail; throughout, there is appropriate reference to the participants, procedures, data collection methods, and data analysis strategies.

Participants

Convenience sampling was used to identify 25 gymnastics coaches (23 female, 2 male), ranging in age from 19 to 40 years (M age = 23.4, SD = 4.53), enrolled in a formal gymnastics level 3 coach education programme at VTS (see Table 1). The level 3 programme (118 hours) required coaches to have at least one year of coaching experience at a recreational gymnastics club level and to be in possession of the level 2 certificate. In our sample, coaching experience averaged 6.6 years (SD = 4.41). The level 3 programme prepared coaches to teach more advanced gymnastics skills to recreational and beginner competitive gymnasts, to plan periodically, and to coordinate club activities. Most of the coaches who attended this programme were coaching on a voluntary basis, combining their (evening or weekend) coaching activities with a full-time job or study. All 25 coaches took part in a

common weekend programme, but 14 female gymnastics coaches in the ‘intervention group’ (M age = 23.3, SD = 5.41) were given an additional course: ‘Personal Development Planning (PDP) for sports coaches’ (i.e., the intervention aimed at developing critical reflection skills), unlike the 11 gymnastics coaches of the ‘control group’ (9 female, 2 male; M age = 23.5, SD = 3.36).

Procedures and data collection

Prior to this programme (in 2020-2021), VTS level 3 gymnastics coach education programmes did not include specific learning materials to enhance critical reflections skills. However, before the start of the 2020-2021 level 3 programme, during an orientation meeting held by the programme director, all coaches were told that an extra course ‘PDP for sports coaches’ would be embedded into the programme for a limited number of coaches (i.e., the intervention group), selected at random by the programme director who did not take part in this study as an investigator. Coaches were told that if they chose not to participate in this study, their status on the programme would be unaffected. It was made clear that coaches’ outcomes would in no way be impacted by their participation and no formal grades would be assigned for this extra course. All coaches were informed of the study procedure, reviewed the participant information sheet, and gave voluntary and informed consent before taking part in the study. Next, all 25 coaches completed a general information form to obtain details related to age, gender, coaching experience, perceived reflection capabilities, and extent to which value was attached to reflective tasks. The principal investigator ensured that all personal information was kept confidential throughout the study.

Before the start of the programme, all coaches were asked to confidentially submit online responses (by e-mail using a basic Microsoft Word template) to a set of five reflective prompts (see Table 2), which were used by investigators as the pre-test measurement to assess critical reflection skills of coaches at baseline. The technique of reflective prompts is

commonly used in coach education to enhance and assess reflection skills (Kuklick et al., 2015; Trudel et al., 2020). To select the five prompt questions, we drew upon Joe Erhmann's personal-coaching narrative activity, referred to by Gilbert & Trudel (2013), Gilbert (2015), UK Coaching's framework for critical reflection (UK Coaching, 2018), and UK Coaching's questions for effective reflection (UK Coaching, 2019). Face validity, to ensure that these prompts appeared to measure critical reflection skills, was established through a pilot test with coaches who participated in previous level 3 coach education programmes in other sports. Furthermore, the prompts were also reviewed by four expert coach developers. Expert coach developers are defined as having more than ten years of experience as a coach developer, active involvement in coaching activities within multiple coach education programmes per year, expertise in providing one-to-one mentoring, and completing the VTS blended training programme for coach developers on developing critical reflection skills. This methodology is consistent with the work of Kuklick et al. (2015), where pilot testing for face validity was established in a similar way, based on the work of Hardesty & Bearden (2004) and Holden (2010).

A timeframe of three weeks was provided to participant-coaches to respond to the prompts. Participant-coaches received no specific guidelines related to the word count, no sight of peers' responses, and no feedback on their answers to control for any confounding effect. After this baseline pre-test, the coach education programme began as usual. Both control and intervention group members followed the same programme during weekends provided by experienced coach developers. The level 3 gymnastics coach education programme (118 hours) entailed courses including movement analysis, motor learning, regulation and judging, scouting and profiling, as well as an extensive internship (45 hours of situated learning experiences/learning in context) under the guidance of a more qualified coach. In addition, all participant-coaches within the intervention group were provided with

the additional course ‘PDP for sports coaches’, aimed at developing critical reflection skills. This course encompassed an introductory class (3 hours), during which coaches collaboratively learned about the Flemish PDP-model (see Figure 1). As a reminder, in line with the postulated syllabus for this course (see Table 3), the coach developer contextualised the course and its learning outcomes within the programme, discussed learning and critical reflection concepts, explored the Flemish PDP-model and related PDP reflection toolkit, guided critical reflection exercises, and introduced personal planning tools. Each participant-coach also had the opportunity to explore a personal reflection toolkit (A4-format, 80 pages, online available via <https://www.sport.vlaanderen/media/12824/trainer-b-trainer-a-reflectiemap.pdf>), which included several exercises and ‘tests’ aimed at evoking critical self-reflection, such as the Ofman core quadrant reflection exercise (Ofman, 2000) and the coaching circumplex approach (Delrue et. al., 2019).

Following this introductory class, participant-coaches were expected to progress with these course materials in a self-paced manner during a period of two months prior to submitting their personal portfolio to the coach developer (which all coaches did), inclusive of all critical reflection exercises connected with the analysis and planning phases of the PDP-model. During this time, coaches had access to the online learning platform ‘VTS Connect’ (accessible via <https://www.sport.vlaanderen/aanmelden?targetLogin=/trainers-en-sportbegeleiders/mijn-vts/>) and online tutorials, audio/video, and course materials. They were also all able to rely on one common coach developer for mentoring support; this is the same coach developer who also provided the introductory class (3 hour) at the start. All coaches engaged in a one-to-one mentoring session (1 hour) held after their portfolio submission, to help them to critically reflect on their competency and expertise in different areas of coaching and gain insight into their personality and applied style(s) of coaching, leadership, motivation, learning, and teaching (i.e., to develop their intrapersonal knowledge). Due to the restrictions

on face-to-face contact caused by the COVID-19 pandemic, mentoring sessions were organised as virtual meetings taking place online using the Microsoft Teams platform.

The assigned coach developer had 10 years of experience, through which they developed their mentoring skills as a result of different learning experiences such as on-the-job training, coach developer activities within VTS coach education programmes, and ongoing continuous professional development. They also completed a blended training programme that was created to support coach developers for this course. This programme included more than 10 different courses (e.g., on PDP-model, personality tests, conducting mentoring sessions, Ofman core quadrant (Ofman, 2000), and action planning). After completing the blended training programme, coach developers were expected to present their portfolio (including their educational background, coach certification, and experience as a coach developer/mentor) to a panel of programme directors to be officially recognised as a coach developer for the PDP course. As expected, and confirmed subsequently to the researchers, during the introductory class and one-to-one mentoring sessions, the coach developer adhered to the standardised guidelines available for this particular course. Their role was therefore not to formally assess the work undertaken by participant-coaches, but solely to encourage further critical reflection, raise self-awareness (i.e., provide coaches with a mirror in which they can see their own beliefs, values, and thought-processes), promote adjustments in the coaches' mental/working models (VanderVen, 2010), and help them to develop metacognitive skills (i.e., become more self-directed, drive inquiry independently, and self-monitor progress). To achieve this, questions used by the coach developer included: “What competencies should a coach who’s active in your daily context primarily master, and why do you think this is the case?”; “What underlying assumptions or values are underpinning your thinking here?”; “What can you learn from past experiences or literature to strengthen your argument?”; “Are there any other broader perspectives (e.g., social, historical,

or cultural) to be taken into account here?"; and "What actions could help you to further develop yourself as a coach?".

At the end of the programme, all coaches were asked a second time to confidentially submit online responses to the same set of five reflective prompts (see Table 2), which were now used by investigators as the post-test measurement to assess critical reflection skills of coaches at the end of the programme. The same procedures as for the pre-test were applied. A timeframe of three weeks was set for coaches to respond to the prompts. No specific guidelines about the word count were provided, coaches could not view peers' responses, and no feedback on coaches' reflections was provided. A chronological overview of all activities and test procedures for both control and intervention group members is provided in Table 4.

Measurements

To assess the quality of coaches' critical reflection, all pre- and post-test prompts were read and coded in line with Hatton and Smith's (1995) reflective writing framework (RWF), previously used by multiple authors to identify levels of reflection in student writing (Carlsson, 2021; Moon, 2006; Stoszowski & Collins, 2014; Stoszowski et al., 2021; Whipp, 2003). In this framework, the following four types of writing are identified, presented in ascending order of reflective quality: unreflective descriptive writing; descriptive reflection; dialogic reflection; critical reflection. In essence, the first category signifies an account which is not reflective at all, and only provides basic descriptions of events without any rationale. The second form, descriptive reflection, is characterised by an attempt to provide rationale based often on personal judgement or literature; as the title suggests, this is done through heavy swathes of descriptive writing. The third, dialogic reflection, is a form of dialogue with oneself, in which possible reasons are explored and wider contexts and alternative points of view are taken into consideration. Finally, the fourth category, critical reflection, is identifiable by the high levels of sophisticated reasoning around decisions or events which

takes account of the broader historical, social, and/or political contexts (Hatton & Smith, 1995). As proposed by Hatton and Smith (1995), the three researchers (in the present study) were asked to code every pre-test and post-test prompt according to the highest level of reflection reached within that entry. So, if within a single unit of writing (i.e., a single pre-test for example) both lower and higher levels of reflective writing were employed, this entry was coded according to the highest level that was present (Stoszkowski & Collins, 2014; Stoszkowski et al., 2021). On the few occasions (4% of entries) when coding discrepancies emerged between the researchers, negotiation was pursued until a consensus was reached.

As per Hatton and Smith's (1995) reflective writing framework, all entries were coded on a single four-point scale. As a result, very little distinction or nuance can be determined between coaches' reflective writing capability. Indeed, scales with a larger number of criteria for assessing written critical reflections are scarce within literature. One reason for this might be that identifying the different elements of critical reflection is a reductionist approach to understanding a holistic activity. However, within the field of social sciences, Fisher (2003) developed her own criteria to assess reflective capacity of university students in written work, arguing that "if we accept the position of those educators who contend that critical reflection is essential in fostering transformative learning, then developing such transparent criteria may prove very important" (p. 324). Following the argument of Fisher (2003), we also believe that to devise and deploy a more sensitive instrument to the analysis of reflective writing capability could add value for multiple reasons. First, results of this multi-criterion instrument could be benchmarked against the framework of Hatton and Smith (1995) for the purpose of seeking validation. Second, examining different criteria can illustrate where significant progress is or isn't made as a result of the intervention. To devise such a scale, we drew upon the reflection toolkits and rubrics established at the University of Edinburgh (2020) and the Indiana University – Purdue University Indianapolis (Jones, 2014). Consistent with Fisher's

approach, we also used existing critical reflection portfolios of coaches in similar VTS level 3 coach education programmes in swimming and horse riding to pilot test our assessment rubric. As above, the purpose of this pilot testing was, again, to establish face validity and ensure that a correct interpretation of all criteria was perceived by each researcher when assigning a rating. This was done in consensus by all researchers. As a result, one criterion (“Appropriate answering to each of the questions”) was withdrawn and definitions of the different criteria were refined. This approach is consistent with the work of Kuklick et al. (2015), Hardesty and Bearden (2004), and Holden (2010). The resultant outcome was consistency among researchers when assigning ratings, as evidenced by high inter-rater reliability numbers (see below).

As a result, The Flemish Critical Reflection Measurement Scale (FCRMS, see Figure 2) consists of eight criteria which are valued in demonstrating critical reflection ability. Each of the criteria is assessed on a four-point-scale with following levels: unacceptable (score: 0), reflective novice (score: 1), aware practitioner (score: 2), and reflective practitioner (score: 3). Concrete descriptors for each level of competence are provided for each criterion (see Figure 2). To clarify the use of the FCRMS, we provide descriptions for each of the assessment criteria and offer some additional examples. The first criterion concerns an appropriate description and analysis of the context and experience that is the foundation for the reflection (i.e., setting the stage for the assessor). For example (score 3):

To me, time management is a point of improvement. I'm often running out of time because I have difficulties with estimating how much time is required to complete featured exercises. I really need to be more flexible. I often focus too much on completing all components of my training preparation. Therefore, a 'rushed attitude' is my part, since I often provide too many exercises as well. After stepping back and reflecting on my past training sessions at home, I decided I'd better go for quality over

quantity as a coach. It seems now more effective to me that my gymnasts complete a limited number of exercises in a high-quality way instead of rushing through a large set of exercises with lower quality.

For the second criterion, clarity, it is determined whether both concepts and situation are accessible to an uninformed audience. A score 0 equals writing that is very unclear, so the assessor is not able to picture the situation described, while a score 3 is assigned to coaches who succeed in explaining abstract concepts accurately. For example (score 1):

My areas for improvement as a gymnastics coach are my technical knowledge and helper skills (i.e., more difficult than level I9), my self-confidence and fault analysis can be improved as well as positive stimulation.

The third criterion reflects the depth of reflection/self-awareness; by this we mean, providing evidence of explicitly knowing and understanding one's own strengths, weaknesses, feelings, motives, and desires, or the way others perceive you. The fourth criterion, relevance, considers the extent to which reference is made to past experiences, previous knowledge, and literature, to construct the reflective account. The fifth criterion, authenticity, assesses whether information is shared in a genuine and honest way. For example (score 3):

It is challenging for me to be aware of everything that is happening during a group practice. For example, there is this young gymnast in my group who is inclined to exclude certain other gymnasts. During training practice, he hasn't much opportunity, but in the dressing room, etc., I can't witness what is happening. That frustrates me a lot. I'm not sure how to cope with this.

The sixth criterion, evidence of criticality, examines how critical coaches are about their own assumptions and actions. At best, competing perspectives are taken into consideration in a highly critical manner (score: 3), or in the worst case reflection is limited to just one perspective (score: 1). Criterion seven identifies evidence of willingness to reverse or adapt

ideas and approaches; thus, appreciating to what extent new ideas are embraced. For example (score 3):

I can definitely make further progress as a coach in different areas [...] For example, I would like to gain more insight in how I can support my gymnasts mentally and how I can foresee more intermediate steps to learn specific elements like a backflip.

The final criterion refers to planned future actions. A score of 3 would suggest there is detailed action planning present, based on the insights from the reflection. Or, to the contrary, only very limited actions are proposed without the necessary thought and planning (score: 1). It is important to note that the newly established FCRMS was not shared with participants throughout the study to control for any confounding effect.

By means of the FCRMS, all pre-test and post-test prompts were scored individually by the same three investigators. Similar to the Hatton and Smith (1995) methodology, all entries were coded by researchers against the highest level of reflective writing for each criterion. As a result, coaches' response to each received a score out of 24 points which was then converted into a score out of 10 for ease of interpretation. There was no interaction between the investigators during this assessment process. Pre-test prompts were immediately assessed by every investigator in the week after the submission by participant-coaches. Four months later, post-test prompts were submitted and reviewed, with the time-lag designed to reduce researcher recall of the first reflective accounts. To provide a final score for each prompt, the mean of three individual investigators' scores was computed (see Table 5). To calculate the inter-rater reliability, we calculated the intra-class correlation (ICC). The ICC for the pre-test (2, k) was .973, with a 95% CI [.86, .96], the ICC for the post-test (2, k) was .987, with a 95% CI [.98, .99].

Besides the quality of coaches' reflective writing, we also used the word count function of Microsoft Word to measure the quantity of text in each response to a prompt (see

Table 5); this is not dissimilar to other studies which measured critical reflection ability (e.g., Kuklick, et al., 2015; Stoszkowski & Collins, 2014). Although, we recognise, a greater volume of writing is not simply an indication of increased quality of reflection. Nevertheless, a significant increase in the length of written reflective accounts might be interpreted as a high level of autonomous motivation towards reflective tasks. It should be noted that no instructions on word count were provided to participants in this study.

Data analysis

All statistical analyses were performed using IBM SPSS 27. First, means, standard deviations, and correlations were calculated. Furthermore, we conducted multiple regressions and MANOVA's to test for systematic difference between (a) coaches and (b) conditions in the background variables. This is a common practice in intervention studies (e.g., Reynders et al., 2019) and since we found no systematic differences, we may consider our randomization procedure successful. Since we had a small sample size, we performed a Shapiro-Wilk test to determine the distribution of the dependant variables (i.e., score on RWF, score on FCRMS, and word count). Based on the results of the normality testing, non-parametric tests were used to ascertain the effect of the intervention programme on participant-coaches' self-reflection. First, Mann-Whitney U-tests were performed to examine the differences in scores between the control and the intervention group at Time 1 and Time 2 separately. Consequently, a Wilcoxon-Signed Rank test was conducted to examine the differences in scores between Time 1 and Time 2 within the control group and the intervention group separately. Z-scores, p-values, and effect sizes (r) are provided for the main analyses. Effect sizes were calculated using the formula of Rosenthal (1994), $r = Z/\sqrt{N}$. An effect size less than 0.3 is considered a small effect, one between 0.3-0.5 a medium effect, and an effect size greater than 0.5 is considered a large effect.

Results

Descriptive statistics and correlations

Means, standard deviations and difference scores between pre-test and post-test (Δ) for the variables are provided in Table 6, while correlations can be found in Table 7.

Preliminary analyses

Testing for differences between coaches. First, associations between baseline measures of the quality (i.e., achieved scores) and the quantity (i.e., word count) of the self-reflection and participant-coach characteristics (sex, age, and years of experience) were tested. Two multiple regressions were run to predict coaches' quality (FWR and FCRMS scores) and quantity of writing (word counting) with sex, age, and years of experience serving as predictors. These variables did not relate to the FWR scores of self-reflection ($F(3, 21) = 0.37, p = .78, R^2 = 0.05$), the FCRMS scores of self-reflection ($F(3, 21) = 0.03, p = .99, R^2 = 0.00$), nor the quantity of writing ($F(3, 21) = 0.22, p = .88, R^2 = 0.03$).

Testing for differences between conditions. We examined whether the intervention and control group differed in their demographics (i.e., age and years of experience) and baseline measures (self-reflection quality and quantity of writing). A one-way MANOVA with the baseline measures of self-reflection quality (FWR and FCRMS scores), quantity of writing (word count), age, and years of experience as dependent variables and condition as a fixed factor was performed. The results showed no statistically significant differences in the dependant variables based on the condition ($F(5, 19) = .68, p = .64, \text{Wilk's } \Lambda = 0.85, \text{partial } \eta^2 = .15$). As a result, we may assume that the baseline measures of FWR scores, FCRMS scores, word count, age, and years of experience do not differ significantly between the intervention and the control group.

Main analyses

Hatton and Smith's (1995) reflective writing framework (RWF). A Mann-Whitney U-test was performed to compare the RWF scores between the control and the intervention

group at Time 1 and Time 2 separately. The results showed no significant differences at Time 1 ($Z = -0.88, p = .47, r = 0.18$), however at Time 2 the scores differed significantly ($Z = -2.77, p < .01, r = 0.55$). Consequently, a Wilcoxon-Signed Rank test was conducted. It confirmed that in the intervention group the scores based on the RWF increased from Time 1 to Time 2 ($Z = -2.67, p < .01, r = 0.53$), while in the control group the scores did not differ between Time 2 and Time 1 ($Z = 0, p = 1, r = 0$).

Flemish Critical Reflection Measurement Scale (FCRMS). First, we performed a Mann-Whitney U-test to examine the differences in scores on the FCRMS between the control and the intervention group at Time 1 and Time 2 separately. The results showed no significant differences in the scores on the FCRMS at Time 1 ($Z = -1.62, p = .11, r = 0.32$), while we found a significant difference at Time 2 ($Z = -3.10, p < .01, r = 0.62$). Consequently, a Wilcoxon-Signed Rank test was conducted. It confirmed that in the intervention group the quality of self-reflection increased from Time 1 to Time 2 ($Z = -2.83, p < .01, r = 0.57$), while in the control group the scores did not differ between Time 1 and Time 2 ($Z = -1.05, p = .29, r = 0.21$).

Furthermore, we examined whether the participants improved more on some criteria of the FCRMS than on others. Means and standard deviations of the eight criteria separately can be found in Appendix 1. Mann-Whitney U-tests showed no significant differences between the control and the intervention group for the eight criteria separately at Time 1, while significant differences were found for all eight criteria at Time 2. Finally, Wilcoxon-Signed Rank tests confirmed that in the intervention group the quality of self-reflection increased from Time 1 to Time 2 for all eight criteria, while in the control group scores in none of the eight criteria differed between Time 1 and Time 2 (see Appendix 2 for the Z-scores, p-values, and effect sizes).

Quantity of writing (word count). A Mann-Whitney U-test was performed to compare the number of words between the control and the intervention group at Time 1 and Time 2 separately. The results showed no significant differences at Time 1 ($Z = -1.75, p = .09, r = 0.35$), however at Time 2 the scores differed significantly ($Z = -2.96, p < .01, r = 0.59$). Consequently, a Wilcoxon-Signed Rank test was conducted. It confirmed that in the intervention group coaches wrote significantly more words at Time 2 than on Time 1 ($Z = -3.11, p < .01, r = 0.62$), in the control group the number of words did not differ between Time 2 and Time 1 ($Z = -1.68, p = .09, r = 0.34$).

Discussion

Considering these results in full, we argue that there is a case to be made concerning the positive impact of the intervention on coaches' critical reflection skills and capabilities; this is demonstrated by using *both* the RWF *and* FCRMS tools. Coaches in the intervention group produced significantly improved post-test responses to prompts, in contrast to both their own pre-test responses and the post-test responses of the control group. Furthermore, although all participants had the opportunity to provide brief answers (even bullet points), participants within the intervention group deliberately chose, at the time of post-test, to elaborate on their thoughts more extensively and to offer significantly more text when responding to prompts. This could be interpreted as an indication of increased autonomous motivation towards reflective writing tasks. While the length of answers more than doubled in the intervention group, no significant time-related increase was present for the control group (status quo). The increased capacity to critically reflect *and* a higher autonomous motivation towards reflective writing tasks thus went hand in hand in this particular study. These findings are consistent with the work of Stoszkowski and Collins (2014).

Hence, the current study provides evidence to suggest that coaches' critical reflection (intrapersonal) skills improve when the development of these skills is deliberately prioritised,

promoted, and encouraged through formal coach education. This is an important finding for several reasons. First, despite suggestions in the peer-reviewed literature that formal coach education often fails to contribute to coach learning and/or significantly impact on coaching practice (Williams & Bush, 2019; Sherwin et al, 2017), this study offers an argument to the contrary. Based on the data, we posit that well-considered formal coach education has an important role to play in the professional development of sport coaches. Second, although critical reflection is commonly acknowledged as important (by organisations and individuals responsible for coach development), there is often limited deliberate and direct action to develop the critical reflection capabilities of sport coaches. This study presents one practice-focused tool to be used and further advanced, as the development of coaches' critical reflection capabilities is prioritised in coach education programmes.

Finally, while it may appear banal to suggest, a universal goal of formal coach education programmes is to improve the quality of coaching practice. This is largely attempted through the development of interpersonal and professional *knowledge* and promoting effective and ethical coach *behaviours*. However, an emerging body of work has begun to focus on the extent to which formal coach education can contribute to the development of more *skilled* learners with positive *attitudes* toward learning (McCarthy, 2022, McCarthy et al., 2021a; McCarthy et al., 2021b; Stoszkowski & Collins, 2021; Stoszkowski & McCarthy, 2018). We believe that this study contributes to those arguments made within the cited research.

While it has been demonstrated that progress can be made (regarding the development of coaches' critical reflection skills) in a limited timeframe, we propose that certain preconditions should first be met. First, we speculate that an expert/well-trained (as defined in the context of this study, within the methodology section) coach developer appears to be an important mechanism in facilitating this progress. Indeed, investing organisational resources

such as time, finance, and personnel, in the training of coach developers appears to be important. As the role of the coach developer in the delivery of formal coach education is becoming increasingly recognised within the research (e.g., Dohme et al., 2019; McCarthy, 2022; North et al., 2020), we contend that this work should remain a priority. In the present study, it is perhaps worth reiterating how the coach developer can be considered an integral feature of the intervention. There is little doubt that factors contributing to the development of coaches' critical reflection skills included the high-trust, learning-oriented environment which the coach developer promoted.

Second, a clear framework (including materials and activities) on how to deliberately promote, encourage, and assess critical reflection skills is required. Sharing this framework with coaches in advance and being clear about intentions is consistent with approaches to formal coach education which contribute to coach learning (McCarthy, 2022, McCarthy et al., 2021a; McCarthy et al., 2021b). Indeed, specific to the development of critical reflection skills, Fisher (2003) argues:

...it is possible for students in the social sciences to improve their capacities for critical reflection. This requires teachers offering clear guidance about what is required for critical reflection, giving feedback on how reflective capacities can be improved, and modelling critical reflection throughout the course... I suggest they may prove beneficial in guiding those teachers who not only wish to demystify critical reflection to their students, but who also wish to employ clear and transparent criteria for assessment. (p. 324)

However, as we make the claims outlined within this section, we also offer some notes of caution and acknowledge the limitations of this research. First, the mean post-test score on the FCRMS of the intervention group was 5.41 out of maximum of 10. Indeed, it is evident more progress could have been made in further enhancing the critical reflection skills of the

participant-coaches. As such, we present this work as a place to begin and encourage interested others to develop the robust but embryonic tools offered so far. Moreover, we also encourage the sustained use of the ideas offered and recognise the short-term nature of our intervention. For example, prioritising and revisiting critical reflection activities on an ongoing basis, across individual programmes and entire pathways (in this case, VTS level 1, 2, 4, and 5). As the present study fails to test for retention (like a longitudinal study might), we have little understanding of how sustained the improvements in critical reflection will be or how they might taper off. As such, we encourage future research to investigate the issue of fall-back (i.e., below, to, or above baseline). For instance, since critical reflection within this intervention was strongly structured and scaffolded, we are curious about the extent to which this type of reflective activity might become more spontaneous in the future (Knowles et al., 2006; Trudel et al., 2020). Finally, we are aware that our rather small sample size is a limitation and intend to explore the use of these tools with a greater breadth of coaches. Further to this issue, we also recognise the make-up of our near all-female participant pool and unique nature of gymnastics as a sport; we are curious to understand the effect (if any) this may have had on the results of this study and extent to which they might be more widely generalisable (or not).

Conclusion

The present study demonstrates the potential for formal coach education programmes to contribute to the development of coaches' critical reflection skills. This is against a backdrop where these skills are argued to be important but are often ill-considered/unlikely to be prioritised within formal coach education settings (for the variety of reasons outlined earlier). As such, we hope that this study can be viewed as a stimulus for the development of frameworks and evidence-based tools to do this work, which we appreciate can be challenging (Hatton and Smith, 1995). We note too that the role of the coach developer

appears to be significant in the implementation of any such framework/tool. They are the intermediary between ideas and action, their personal resources will determine (to some varying degree) the nature of outcomes associated with attempts to develop coaches' critical reflection skills. Accordingly, we compel organisations and individuals responsible for coach education to consider this alongside researchers who should continue to examine this phenomenon.

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