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ARTICLE *in* EUROPEAN PHYSICAL EDUCATION REVIEW · APRIL 2016

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European Physical Education Review
1–19

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DOI: 10.1177/1356336X16639212

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Abstract

Although assessment practices are commonly part of the physical education (PE) curriculum they may often frustrate rather than support students' basic needs for autonomy, competence and relatedness. Nevertheless, assessment also provides various promising opportunities to support these basic needs and enhance learning in students. In order to address this issue, we developed an in-service teacher training programme that was grounded within contemporary theories on

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assessment and motivation, and aimed at improving PE teachers' expertise on motivational assessment practices. In close collaboration with PE teachers and other experts in the field an in-service teacher training programme was developed that covered important topics such as quality assessment, motivation and assessment for learning. Specific attention was directed to the translation of theoretical concepts into practical and applicable tools. The in-service training programme was then provided on-site three times to a total of 33 PE teachers (of whom 20 were male (60%) and 12 were female (40%), teaching experience 3–32 years) representing different PE departments. Through an iterative cycle of development, provision, evaluation and adjustment the programme was gradually optimised. Focus group sessions and questionnaires were employed to evaluate various aspects, and identify barriers and success factors. The in-service teacher training programme is a successful first step in improving the expertise of PE teachers to start and develop higher quality and more motivating assessment practices. Nevertheless, in order to generate durable change within daily PE practice, follow-up training sessions or counselling methods (e.g. through communities of practice) are essential to overcome implementation barriers. Development, adjustment and future directions for assessment are discussed.

Keywords

Assessment, assessment for learning, self-determination theory, basic psychological needs, continuous professional development (CPD)

Introduction

Assessment has been identified as one of the most troublesome topics in physical education (PE) (López-Pastor et al., 2012). PE teachers need to deal with large intra-class differences in students' motor abilities (Gallahue and Donnelly, 2003) and are thus challenged to develop and use assessment forms containing realistic criteria for all students (Melograno, 2007). However, PE teachers generally lack a profound theoretical and practical knowledge about assessment (Redelius and Hay, 2012), possibly induced by a lack of guidance and support on this topic (Ní Chróinín and Cosgrave, 2012). This often results in assessment practices in which grading criteria and grading decisions are unclear to students (Borghouts et al., 2016; Melograno, 2007; Redelius and Hay, 2012; Vanderlinde and Van Braak, 2010). Also, when considering current practices in the field of PE, assessment is based on rather traditional views, including predominantly teacher-directed assessment, employment of subjective criteria and emphasising aspects such as effort and clothing (Borghouts et al., 2016), which is questionable in terms of assessment quality and content (López-Pastor et al., 2012). This could be the result of suboptimal teacher training on this subject, which is most likely the case in Physical Education Teacher Education (PETE) programmes in the Netherlands (which are the context of this study). Although assessment is officially part of all PETE curricula (ALOCO, 2013), the amount of time spent on this topic as well as the views on student assessment in PE vary between universities.

Since quality PE is characterised by the mutually related fundamental dimensions of curriculum, pedagogy *and* assessment (Penney et al., 2009), PE programmes would certainly benefit from the development of continuing professional development (CPD) on the topic of assessment. Moreover, the way in which students are assessed can considerably affect students' motivation to move and learn (Johnson et al., 2011; Maes et al., 2016), which is crucially important in the context

of PE as it aims to stimulate students to adopt a physically active lifestyle. In order to address this issue, the present study, which is part of a larger research programme on student assessment and motivation in PE (STAM), aimed at systematically developing, providing and evaluating a professional in-service teacher training programme that focused not only on providing teachers with up-to-date knowledge and skills on assessment, but also specifically linked assessment to enhancing students' motivation for physical education.

Motivation and assessment in PE

One theory that delineates how students' motivation and related outcomes in PE are affected is self-determination theory (SDT; Deci and Ryan, 2000). SDT suggests that teachers can nurture students' three basic psychological needs: the need for competence (the capacity to effectively interact with the environment), autonomy (experiencing a sense of volition and psychological freedom) and relatedness (experiencing connectedness and intimacy with others) in PE by teaching in a well-structured, autonomy-supportive and relatedness-supportive way (Ntoumanis, 2001; Ryan and Deci, 2007; Van den Berghe et al., 2012). As a consequence, various favourable outcomes could be expected from students in whom these needs are supported, such as better skill development, better quality motivation to be physically active both within (Aelterman et al., 2012) and outside the context of PE (Haerens et al., 2010) and higher intentions to be physically active outside the classroom (Cheon et al., 2012; Van den Berghe et al., 2012). On the other hand, frustrating these basic psychological needs (i.e. through controlling teaching styles) has been found to diminish student motivation in PE (De Meyer et al., 2014; Haerens et al., 2015). In particular, assessment risks undermining students' needs. For instance, traditional grading practices in PE are often employed as 'a point-in-time grading' (Hay, 2006; Hay and Penney, 2009). As a result, these moments of assessment are perceived by students as either pass or fail, rendering it a moment of high stakes assessment, which could lead to feelings of anxiety and incompetence in (less skilled) students (Krijgsman et al., 2016; Maes et al., 2016). In addition, student performances are often compared to standardised norms or to the performances of classmates (Johnson et al., 2011), which could also be especially detrimental for feelings of competence of locomotory less gifted students (Beltran-Carrillo et al., 2012). Furthermore, students are rarely involved in the assessment process (Borghouts et al., 2016), thereby decreasing feelings of autonomy in PE. Feelings of relatedness are possibly frustrated through assessment situations that are emotionally unsafe (e.g. performing a somersault in front of the class, or being assessed on a group dance while the rest of the class watches).

Fortunately, assessment in PE also provides promising possibilities for increasing students' basic psychological needs. Such practices, however, are rarely deliberately employed (Georgakis and Wilson, 2012; Hay, 2006). By adopting the principles of Assessment for Learning (AfL) (Black and Wiliam, 2009; Hay, 2006; Wiliam, 2011), for instance by integrating feed-up, feedback and feed forward in lessons, teachers can provide more structure to the students (Hattie and Timperley, 2007), which has been related to increased feelings of competence (Jang et al., 2010). Feed-up implies that the learning objectives, assessment methods and criteria have been communicated and are clear to students at the beginning of a unit, semester, etc. Feedback then informs students on what progress they have made in their learning process. Subsequently, feed forward shows students what further improvements need to be made to advance their progress towards the desired learning outcomes. Additionally, feelings of competence can be enhanced by taking into account student differences through *differentiation* in the assessment (e.g. by using adaptive assessment methods).

Furthermore, since student involvement and provision of choice are generally low within current assessment practices (Borghouts et al., 2016) it is assumed that feelings of autonomy can be enhanced by allowing and stimulating a more active role in the planning and delivery of assessment. One way to actively involve students in the assessment process is through peer- and self-assessment (Black and Wiliam, 2009). Through peer- and self-assessment students become owners of their own learning, which has been related to increased autonomous motivation (Black and Wiliam, 2009) and increased self-regulation and achievement (Harris and Brown, 2013). Another approach could be to involve students within the construction of the assessment criteria or the moment of assessment. Furthermore, to positively impact on students' feelings of relatedness it seems beneficial to try and provide an *emotionally safe assessment environment* (e.g. not being assessed in front of the whole class).

Continuous professional development in PE

Teacher professional development programmes could have a significant and positive impact on teachers' beliefs and practices, student learning and educational reform implementation processes (Villegas-Reimers, 2004). They allow for teachers to base their daily practice on up-to-date knowledge (Armour and Makopoulou, 2012). Therefore, all teachers are expected to take part in (periodical) teacher training programmes (Borko, 2004). In addition, the perceived gap between educational research and educational practice (Vanderlinde and Braak, 2010) warrants the development of CPD programmes that translate contemporary theories and models to daily educational practice. The PE profession could also benefit from theory-based professional development programmes, especially since many of the currently available training programmes tend to lack scope and challenge (Armour, 2010) and have been characterised as being sporadic, decontextualised and often disconnected from previous professional learning (Armour and Makopoulou, 2012). An effective PE teacher training programme therefore, should enable teachers to put theory into practice by connecting with teachers' everyday practice (Armour and Yelling, 2004). Preferably, teachers from different PE departments are grouped together, thereby creating opportunities for teachers to interact and share ideas (Armour and Makopoulou, 2012; O'Sullivan and Deglau, 2006). Teachers should then become actively engaged in learning through meaningful discussion, practice and planning (Garet et al., 2007).

Within PE, various dominant practices exist that seem to be quite resistant to change (Kirk, 2010), including assessment. Prompted by this, and by the absence of a solid, theory-based professional development programme on assessment and motivation and by the perceived lack of teacher support on this topic (Ní Chróinín and Cosgrave, 2012) the central aim of this study was to systematically develop and optimise a teacher-training programme on need-supportive assessment in PE, grounded in contemporary theories on assessment and motivation.

Methods

Recently, Aelterman et al. (2013) have proposed a framework that allows for the systematic development of theory-based CPD programmes in PE. In our study we adopted a similar iterative research design of provision, evaluation and revision, while closely collaborating with PE teachers in the field. In Figure 1 a visual representation is depicted of the corresponding development and optimisation process.

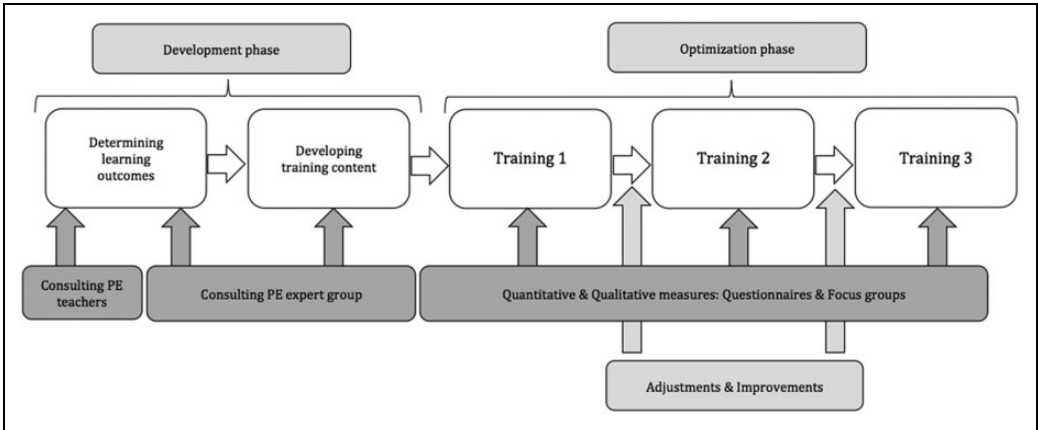


Figure 1. Flowchart of the development and optimisation process.

Development phase

Participants and procedures. The development process commenced with inviting a group of five experienced PE teachers representing all educational tracks¹ for a discussion session on assessment practices in PE. Topics included current practices, desired changes, perceived problems and barriers, and desired support and guidance. Based on the outcome of the discussion, initial learning outcomes of the training programme were determined. Then, the intended learning outcomes were presented to an expert panel consisting of the five PE teachers supplemented with five teachers in PETE, two representatives of the Dutch Institute for Curriculum Development and a representative of the national PE board. Learning outcomes were then finalised and communicated as follows: *To enhance PE teachers' knowledge on general and motivational aspects of quality assessment and to provide them with the skills to implement these aspects into their daily practice.* Next, an extensive review of the general and PE-specific assessment literature on quality assessment, AfL, and student motivation was conducted. All relevant findings were delineated and translated into practical, accessible information for PE teachers and transformed into challenging theoretical and practical instructional parts. Then, before providing the first training programme, the outline and content were again presented to the expert panel, which resulted in constructive feedback that was then used to finalise a first version of the teacher training programme.

Two PETE teachers, who were involved in the development phase and had substantive knowledge and experience in assessment and motivational theory, provided the training programme. In addition, the trainers held multiple years of teaching experience in PE. The four-hour in-service teacher training programme was divided into theoretical and practical parts, which are discussed below.

Theoretical part. Prior to the training programme, participants filled in a short questionnaire that tapped into various PE assessment topics. Then, by starting off with a group discussion based on participants' answers on these questions we adopted a problem-based approach and aimed to activate previous knowledge (Merrill, 2002). Examples of questions were: 'I involve my students in assessment practices' or 'what aspects do you assess your students on' Then, in the first theoretical part, participants' knowledge of the attainment goals for PE was refreshed. Although these

goals do not provide an outline for the actual content of PE lessons, they do prescribe the development of various skills: e.g. movement, organising, supporting and social skills. Nevertheless, research shows that teachers often have a rather limited focus on improving, and thus assessing, movement skills (Borghouts et al., 2016). What is problematic in this respect is that often students are compared to a set of pre-set standards that are largely age- and/or sex-related, but that are often unattainable by a substantial number of students within a class. Therefore, attention was also directed to the official examination resolution for PE, which states that grading should take into account the individual possibilities of each student. With this part we attempted to provide insight into the broader aims of assessment in PE.

To trigger previous knowledge on motivational aspects of PE in general, and with regard to assessment in particular, participants were asked to analyse four video recordings of assessment practices within four different PE domains (games, gymnastics, track and field, and dance). Participants were asked to determine to what degree the assessment methods that were portrayed in the videos contained motivating or de-motivating aspects for students and label those aspects as such in their own words. The trainer discussed each video with the participants before introducing the self-determination theory applied to the context of PE. In particular, the three basic needs of autonomy, competence and relatedness were emphasised as fruitful starting points for teachers to enhance the motivational aspects of their assessment practices. Subsequently, a theoretical section on constructive alignment was followed by the introduction of four practices of need-supportive PE assessment as clarified in the introduction to this paper: (i) student involvement, (ii) structure (feed-up/feedback/feed forward), (iii) differentiation and (iv) providing an emotionally safe assessment environment. These aspects were integrated into the Motivating Assessment Mixing Console (MAMC), which was specifically developed within the framework of this study to serve as an appealing and practical tool for improving motivational assessment quality (Figure 2(a)). The MAMC was designed to provide insight into how motivational aspects in assessment are related to feelings of competence (C), autonomy (A), relatedness (R) and motivation. For example, a teacher could reflect upon a current assessment practice within gymnastics with regard to the amount of feed-up, feedback and feed forward present. Consequently, by envisaging moving the 'sliders' up, the teacher can decide to provide the students with more feed-up (e.g. communicating learning goals and grading criteria) to provide more structure, which could enhance students' feelings of competence. This will result in the lighting up of more lights in the MAMC for competence (C) and the motivation gauge will change (Figure 2(b)). Although the MAMC is not a 'real' working instrument, it allows teachers to critically review and enhance motivational aspects related to any given assessment within their current practice, providing insight and ideas for improvement.

Practical section. In order to put the theory into practice, and integrate knowledge and skills by connecting with teachers' everyday practice (Armour and Yelling, 2004; Merrill, 2002), participants then moved to the sports hall where the four assessment situations depicted earlier in the video recordings were set up. Participants were organised into four groups and asked to improve the motivational quality of the assessment activities by using the MAMC tool. In line with findings by Armour and Makopoulou (2012) teachers from different PE departments were deliberately grouped together, in order to enhance collaborative learning with and from professional colleagues bringing in different experiences. The practical assignment was concluded by an extensive discussion moderated by the trainer in which the four groups had to justify the newly developed assessment using elements of the theoretical framework. For the final assignment PE departments were grouped together and asked to discuss changing one or more elements of their current assessment program.

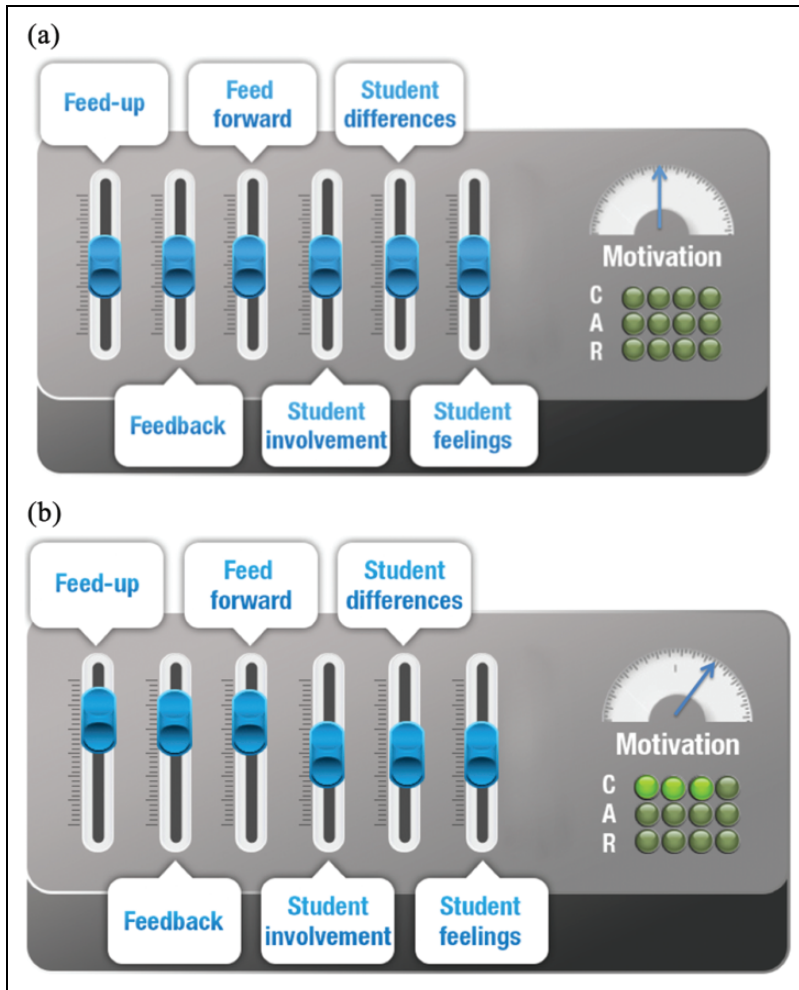


Figure 2. (a) The Motivating Assessment Mixing Console (MAMC). (b) An example of employing the MAMC. Providing feed-up, feedback and feed forward could result in higher feelings of competence in students and in higher quality motivation.

Optimisation phase

Participants and procedure. A convenience sample consisting of 12 schools from three cities in the south of the Netherlands was contacted. Each PE department was invited to send three to four delegates to attend a training session, which took place in the city where the schools were situated. Final participants were 33 PE teachers (of whom 20 were male (60%) and 13 were female (40%)) from 11 secondary school PE departments. Average teaching experience of the participants was 11.5 years (range 3–32 years) and the average age was 35 years (range 23–48 years). All teachers held a bachelor degree in PE, which is a four-year education programme in the Netherlands that allows for teaching PE from primary school up to vocational and academic tracks. All teachers taught their

lessons according to the goals stated in the national curriculum, which prescribe teaching in five broad domains: games, track and field, gymnastics, self-defence and dance (Brinke et al., 2007). Nevertheless, these broadly defined goals do provide teachers with substantial autonomy in choosing specific content, didactical approach and type of assessment in order to provide possibilities for situational adaptations such as educational track (vocational, academic), age, etc.

In total, three training sessions were provided to three different groups of teachers. In line with recommendations by O'Sullivan and Deglau (2006) these sessions were delivered on-site to make the experience more authentic. In appreciation of teachers' voluntary participation the training session was offered free of charge. No further incentives to participate were provided. Based on teacher feedback, the training programme was adapted and revised and provided to the next group of teachers until quality standards with regard to the intended learning outcomes of the training programme as viewed by PE teachers and researchers were met. All 33 teachers who attended the training session first filled out an informed consent form in which they agreed to participate in the study. All teachers filled in the post-training session questionnaire and all teachers but one attended the post-training session focus group.

Appreciation questionnaire and focus groups. Both quantitative and qualitative measures were used to evaluate the teacher training programme. Questionnaires were employed to obtain an overview of various aspects of the training programme, whereas focus group sessions were held to validate quantitative findings, investigate convergence between measures and to reveal underlying motives, beliefs and opinions on these aspects.

Upon completion of the training programme, participants were asked to fill out an appreciation questionnaire (Aelterman et al., 2013) to evaluate all parts of the programme on five aspects: (1) interaction, (2) innovation, (3) interest, (4) intelligibility and (5) essentiality. A second part of the questionnaire tapped into practical usefulness, barriers to implementation, programme delivery and an overall rating of the training programme. All aspects were rated on a five-point scale except for the overall rating, which was scored on a scale from 1–10.

Following each training programme, a focus group session was organised (Greenbaum, 1997; Morgan and Krueger, 1998). To facilitate interaction, participants wore a clearly visible nametag and were positioned in a half-circle. An experienced moderator who was familiar with the goals of the study, but did not deliver the intervention, led the discussion. The focus group commenced with an introduction on how the focus group would work and then followed the structure of a pre-defined topic list that was based on the appreciation questionnaire. Depending on the answers provided by the teachers the moderator could follow-up on certain topics or could ask for clarification if deemed necessary. The moderator's task was to facilitate the discussion, bring in all pre-defined subjects and give all participants an equal say. The trainers were not present during the focus group session to allow for a greater freedom of speech among the participating teachers. However, the moderator was assisted by a co-moderator, who took notes and provided support by bringing in subjects that had not yet been covered during the session. In order to increase the trustworthiness of the data, all focus group sessions were audio- and videotaped, transcribed verbatim and supplemented by the notes of the co-moderator. Nevertheless, it must be acknowledged that, as is inherent in a largely qualitative study, generalisability of its findings to other populations is limited.

Analyses. Questionnaire data was pooled into SPSS version 22 (Armonk, NY: IBM Corp.). Since we attempted to iteratively optimise the training programme, analysis of variance (ANOVA) was employed to reveal any differences in the appreciation of the different sections of programme

between training sessions. Thematic content analysis on the focus group data was employed to analyse the focus on identifiable themes and patterns (Aronson, 1994). In the first phase (exploration phase; Miles et al., 2014), all relevant parts were labelled with pre-defined theme-labels representing the different topics of the focus group. Examples of topics that emerged were: practical usefulness, the link between theory and practice, and barriers to implementation. This resulted in each relevant part of the focus group being assigned a theme-label. Next, variation labels, descriptive labels that reflected the participants' opinions within each theme, were assigned. Examples of variation labels were clarity, novelty, group composition and length of the training programme. During the second phase (specification phase), all parts were arranged according to their theme-labels and their subsequent variation label. This allowed for clustering of focus group parts around certain themes and variations for playback and further analysis. In the last phase (reduction phase) results were systematically described around all themes and variations. During the whole qualitative analysis, a logbook was kept to store all decisions and considerations.

Results

In order to provide a comprehensive view, questionnaire and focus group results will be alternately described below. Descriptive data on the three focus groups is presented in Table 1 while scores on the appreciation questionnaire data are shown in Table 2.

Table 1. Overview of the three post-training focus groups.

	<i>n</i>	Gender		Age M (SD)	Range	Teaching experience	
		Male	Female			M (SD)	Range
Focus group 1	9	6	3	37.9 (2.76)	24–48	13.6 (2.63)	3–25
Focus group 2	12	7	5	32.25 (1.94)	23–46	9.8 (1.61)	3–22
Focus group 3	11	7	4	39.2 (3.20)	25–56	15.2 (3.80)	4–32

Overall, participants highly valued the training programme, with an average rating of 8.2 (± 0.56) on a 10-point scale that did not significantly change across the three training sessions. Focus group data revealed that participants acknowledged the difficulties surrounding assessment practices as well as a perceived inability to make meaningful changes. However, the programme provided them with much food for thought and was deemed a good starting point to begin to make alterations in their daily PE practice:

Within one hour I was convinced that some things had to change in my daily PE practice [T3].

In particular, teachers appreciated the theoretical depth that was provided while the practical application within the context of PE always remained at the forefront. The various sections of the training programme are evaluated in more detail below.

Theoretical section

Participants expressed their enthusiasm about the discussion as a starting point for the training programme. They immediately felt immersed in the topic, which prompted them to critically

Table 2. Mean scores (SD) on the appreciation questionnaire items in the three training sessions.

	Training 1 (n = 10)	Training 2 (n = 12)	Training 3 (n = 11)	F df [2, 30]
Theoretical background				
Interaction	4.09 (0.70)	4.50 (0.67)	4.50 (0.53)	1.484
Innovation	4.00 (0.63)	4.08 (0.79)	4.00 (0.47)	.62
Interest	4.27 (0.42)	4.11 (0.59)	4.23 (0.27)	.392
Intelligibility	4.36 (0.32)	4.46 (0.40)	4.35 (0.41)	.276
Essentiality	3.27 (0.90)	3.83 (0.93)	3.60 (1.00)	1.036
Overall	4.00 (0.37)	4.19 (0.43)	4.14 (0.38)	.735
Practical assignments				
Interaction	4.36 (0.50)	4.25 (0.62)	4.10 (0.74)	.468
Innovation	3.81 (0.87)	3.75 (0.62)	3.70 (0.67)	.070
Interest	4.14 (0.81)	4.29 (0.62)	4.25 (0.35)	.184
Intelligibility	4.23 (0.41)	4.25 (0.58)	4.05 (0.37)	.568
Essentiality	4.46 (0.52)	4.75 (0.45)	4.50 (0.70)	.923
Overall	4.12 (0.49)	4.15 (0.41)	4.08 (0.24)	.299
Practical usefulness	4.44 (0.39)	4.36 (0.50)	4.30 (0.27)	.320
Barriers to implementation	1.90 (0.39)	1.90 (0.34)	2.34 (0.36)	5.182*
Presentation	4.44 (0.40)	4.57 (0.35)	4.43 (0.26)	.565
Overall score (1–10)	8.22 (0.47)	8.23 (0.76)	8.20 (0.42)	.010

* $p < .05$ All scores were scored on a five-point Likert scale ranging from totally disagree (1) to totally agree (5), except for the overall score, which was scored on a 10-point rating scale.

review their own assessment practices. For some participants this process already started after completing the preceding questionnaire that led up to the discussion:

The questions really made me think . . . and although some questions were rather difficult it immediately made me critically evaluate my own daily practice, it got me really involved since you're wondering how are we doing this and that [T3].

Scores on the theoretical section were generally high (>4.00 ; Table 2) and did not significantly change across the three training sessions. One exception was essentiality, which consistently scored somewhat lower than the other aspects of appreciation during all training sessions. Focus group data from the first training session further revealed that some participants found the theory, especially SDT, to be quite complex, which they related in part to the fact that it was new for them. For example, since SDT consists of various sub-theories, such as basic needs theory and cognitive evaluation theory (Ryan and Deci, 2000), some participants had trouble understanding the relationships between concepts such as basic needs and motivational quality. Despite our attempt to enhance the practicality and applicability of SDT in a PE context in the two following training sessions, by using more and better PE-related examples, essentiality scores did not significantly improve over time.

Interestingly, focus group data revealed that teachers were unaware of some important goals as stated in the national curriculum, such as adapting assessment to the abilities of the student and taking supporting skills into account in the assessment (e.g. organising, refereeing and coaching).

Practical section

Participants were generally very positive about the practical assignments that took place in the gymnasium. All aspects scored >4 on a five-point Likert scale except for innovation, which scored a little below 4 (Table 2). Scores did not significantly change over the course of the three training sessions. Essentiality even scored >4.5 over all three training sessions, indicating that participants highly valued the practical application of theoretical concepts on assessment and motivation. The MAMC toolbox (Figure 2a) was also well received, with participants especially praising the conversion of important theoretical constructs into daily PE practice, insights for implementation as well as the flexibility to employ the instrument within various PE subjects. A participant from the first training session put this as follows:

The MAMC is really innovative and directly applicable in my daily practice . . . it leaves enough room for adaptation to my specific PE context [T1].

Nevertheless, a participant in the third training session also mentioned the somewhat overwhelming amount of choice that was provided:

The MAMC is a nice way to get going, however it also complicates things. What do I choose? Feedback, feed-up, feed . . . something else? [T3]

Participants found the first practical assignment (adapting an existing assessment situation) useful and instructive and indicated that the four assessment situations in the gymnasium closely resembled the difficulties they experienced in their own teaching practice. Presenting and discussing the findings of each group afterwards and receiving feedback from the trainers were also deemed insightful, although some participants wanted to spend more time on the group discussion afterwards. The comments below reflect some thoughts:

The situations as depicted in the video and in the gymnasium were very recognisable, absolutely [T2].

Well you know, if we just had five more minutes for the discussion at the end, just some extra time, because this is where I learn the most. Talking about it, sharing experiences provides even more insight [T2].

Generally, participants favoured ending the training programme while reflecting on its content with their direct colleagues. However, time constraints, especially in the third training session, kept them from coming to a well thought out and coherent consensus. It was also mentioned that discussing changes with only two to four member of the PE department present was not as effective as it could be.

I thought it was really good to have a reflective moment at the end of the training session with your own colleagues . . . even if we were only with two from our PE department. It immediately yielded a lot of results, but it's so easy to walk out of the door here, come home and start thinking about other things. At least we made a very modest start of what we would like to change [T2].

Based on these experiences some participants proposed organising a follow-up training session or department-specific coaching programme in collaboration with an expert on the topic.

Organisation and delivery

Presentation of the training programme scored >4 in all training sessions and did not significantly change over the course of three training sessions. Focus groups revealed that participants especially valued having credible experts in the field of PE providing the training programme. Interestingly, some participants were pleased that trainers did not judge their current practices but instead focused on providing constructive feedback on how to make improvements.

Questionnaire data indicated rather low scores on barriers to implementation within daily practice. Notably, barriers to implementation were the sole aspect of the training programme that changed over the course of the three training sessions ($p < .05$). Post hoc analysis indicated that participants in the third training session saw significantly more hurdles than the participants in the first two training sessions. Although perceived barriers were still below the midpoint (<3), some critical remarks were made, especially during the third focus group session. A concern that was brought forward was the anticipated unwillingness of colleagues (who did not take part in the training session) to make changes. Since teachers attending the training session did so of their free will, their readiness to change was likely to be perceived to be higher than that of their colleagues. Also, since the training programme had provided them with such an abundance of novel ideas, some teachers felt somewhat overwhelmed and did not know exactly where to start the improvement process when returning to their own daily practice. The following quote illustrates these concerns:

We have 11 people in our PE department who should be more or less in agreement. You cannot do something with three colleagues who deviate from the rest [T3].

Furthermore, time constraints in their daily practice were identified as possibly hindering the construction and implementation of new assessment methods. In particular, most teachers understood that by changing their assessment they also had to make minor or major changes to their curriculum and pedagogy as well.

When we dive into this, this implies reconsidering our vision on PE as a school subject, drafting a new outline of the curriculum, perhaps constructing new lesson plans, reach a consensus on this. We have to do all this before choosing our assessment methods... this whole process costs a lot of time [T1].

In addition, although the PE teachers found the training programme to be an excellent starting point, they also pointed out that they needed extended guidance when making changes at their schools. Suggestions were made for a longer training programme, follow-up training sessions and continual coaching.

Discussion

A challenge within assessment is to nurture rather than frustrate students' needs for competence, autonomy and relatedness (Krijgsman et al., 2016; Maes et al., 2016). In addition, assessment has been identified to be amongst the most challenging aspects within the PE profession (López-Pastor et al., 2012). In an attempt to address these issues we systematically developed, provided and evaluated a professional in-service teacher training programme that focused not only on providing teachers with up-to-date knowledge and skills on assessment, but also specifically linked assessment to enhancing students' basic psychological needs. Given the need for professional

development programmes to bridge the gap between contemporary educational research and the daily practice of teaching (Vanderlinde and Van Braak, 2010), the training programme was systematically developed in close collaboration with PE teachers.

Training programme content

An interesting finding from our study was the lack of knowledge on national curriculum goals, such as the need to take into account individual students' abilities during assessment or assessing more than just movement skills (e.g. social skills and supporting skills). Although identification of this 'knowledge gap' needs validation within a larger sample, this does stress the need for CPD for PE teachers in order to provide lessons that correspond with national curriculum goals (Armour et al., 2012).

The theoretical depth of the training programme was positively received; however, despite our attempt to provide the theoretical background knowledge in a meaningful and authentic way (Armour, 2010; Lieberman and Pointer Mace, 2009), some participants expressed difficulties in grasping the essence of some parts of the theory. For example, some participants initially had difficulties in understanding the essence of SDT and its implications for PE assessment. Although we made efforts to make the theory sink in by providing PE-related SDT concepts in a more meaningful, relevant and appealing manner (Armour and Yelling, 2007), this remained a challenge for some participants. This was also the case within the first practical assignment, where some participants would have preferred more time in order to better process all the information that was provided and more time to further discuss certain assignment outcomes. Indeed, by allowing enough time for critical dialogue, significant learning can be achieved (O'Sullivan and Deglau, 2006); although the trainer specifically linked the participants' assignment outcomes to theories of assessment and motivation during this discussion, devoting more time for reflection might have aided in a better understanding of these theoretical concepts for some participants. This stresses the need for CPD programmes of longer duration, which instigates the development of follow-up programmes.

Interestingly, participants scored somewhat lower on the aspect of innovation during the practical section as compared to the other aspects. Judging by the higher scores on the innovation aspect awarded within the theoretical section, most of the novel aspects of the training programme (SDT, AfL) were probably already discussed there. The subsequent practical application of the theoretical aspects presumably did not add much to the innovative aspect, resulting in a somewhat lower innovation score. One innovative aspect that was found to be quite useful by participants was the MAMC. It seems that our effort to combine concepts of SDT and AfL and show their inter-relatedness within an easy-to-use, practical and applicable tool was readily picked up by most teachers. Nevertheless, some teachers also indicated that, because the MAMC provided them with many options, they were unsure of where to start. Continued guidance and support, by experts or by peers, seems essential here, in order to facilitate the implementation process.

Barriers to implementation

Although teachers viewed the training programme as a good outset to start and improve their assessment practices, barriers to successful implementation were also expressed. An overarching theme in this respect was the expected increase in workload. Most teachers were aware that adapting the assessment practices required making substantial changes to their

curriculum and pedagogy as well (Penney et al., 2009). Often, the daily routines of planning and teaching interfere with the time needed for reflection (Goodyear et al., 2013), making development and implementation a serious challenge. Nevertheless, professional development programmes are seen as critical mechanisms to facilitate teacher learning (Bechtel and O'Sullivan, 2006) that could also produce favourable effects at the school level (Borko, 2004). Therefore, school boards should consider allocating ample resources to teacher learning and curriculum development in order to ensure that students are provided with up-to-date curricula taught by quality teachers.

Another concern voiced concern was the perceived lack of support for making curricular improvements related to assessment by less innovative and change-oriented peers within the same PE department. Since each PE department sent two to four delegates to attend the training programme this likely resulted in the attendance of a relatively progressive group of teachers. Consequently, finding enough support to start and make changes could be a serious challenge.

Previous research on professional learning has shown that profound professional learning takes place over a substantial amount of time and that standalone workshops are therefore not very effective in bringing about changes in teaching behaviour (Guskey and Yoon, 2009). This underlines the importance of continued support and follow-up after an initial training programme (Bechtel and O'Sullivan, 2006) to then stimulate teachers to become active learners. Learning should preferably take place in a meaningful context (school, PE lesson) with teachers reflecting on their own practice for a longer period of time (Clarke and Hollingsworth, 2002). Indeed, a key finding to successfully overcoming barriers that emerged from the focus groups in our study was a strong demand for on-site follow-up. Participants felt that they needed continued support from an expert in the field in order to start and make meaningful changes in their daily practice and to persuade their less change-oriented peers to do the same. This aligns with findings by Goodyear et al. (2013), who point out the pivotal role of an expert within this process and the importance of connecting with the specific context of the teachers in order to implement new skills and knowledge (Bechtel and O'Sullivan, 2006). Perhaps even more important is that changes in teachers' beliefs and attitudes will probably not happen before changes in student learning become apparent (Clarke and Hollingsworth, 2002). This implies that CPD should take into account multiple cycles of reflection, development, application and evaluation. Interestingly, the idea spontaneously emerged from the participants of the second focus group to organise a periodic meeting to discuss various PE related themes. This touches upon the concept of a professional learning community, where teachers or PE departments investigate and improve their own practices through various forms of teacher inquiry (e.g. participatory action research). Professional learning communities have been identified as a promising vehicle to facilitate professional learning and enhance the quality of teaching (Armour and Yelling, 2007; Goodyear et al., 2013; O'Sullivan and Deglau, 2006). When attempting to enhance contextual professional learning, a promising approach for CPD within a community of practice might be involving teachers in a 'lesson study' (Dudley, 2014). In lesson study, a group of four to six teachers first identifies a collective problem they have encountered in their daily practice, for example assessing their students within invasion games. Then, an initial workshop, as presented in this paper, could provide them with up-to-date knowledge and practical tools. In a next step, teachers collectively plan a series of lessons based on these new insights into assessment. One teacher then teaches the lesson while the other teachers observe student reactions and take notes. Next, within a post-lesson discussion, certain aspects are adjusted or improved whereupon the lesson is taught again by a different teacher, with the other teachers as observers. This cycle continues until the lesson has

improved to the satisfaction of the pupils and teachers (usually around three iterations). The resulting 'research lesson' is then presented to colleagues, in such a way that they can benefit from and try it out themselves (Dudley, 2015).

Thus, although our training programme was developed in close collaboration with PE practice, it should rather be viewed as a solid starting point than as a standalone training session. Other possibilities for follow-up vary from a single follow-up meeting (e.g. to reflect on an implementation plan) to on-site periodic counselling (e.g. during a whole school year) tailored to the needs of the PE department. In addition, to facilitate discussion and interaction between different PE departments, various new media and social networking tools such as Twitter, Facebook or website forums could provide effective means to facilitate communication (Lieberman and Pointer Mace, 2009).

Limitations and future directions

Our study is subject to some limitations. First of all, the teachers that enrolled in the training programme did so of their free will, and the research was conducted within a Dutch PE context. Together, this could have reduced the generalisability of our findings to the entire population of PE teachers. Therefore, our findings need validation in a larger, preferably international, sample of PE teachers. Second, attending a single training session has been found to be insufficient to bring about substantial changes in teachers' classroom practices, student learning outcomes or teachers' attitudes (Bechtel and O'Sullivan, 2006). This might especially be the case for a challenging topic such as assessment in PE. We fully acknowledge that continued support is necessary for durable changes in assessment practices.

In order to evaluate the effectiveness of the training programme and follow-up, we propose that further research is employed, aimed at investigating teachers' and students' perceptions and attitudes with regard to the implementation of new assessment modes. In particular, the impact of such changes on student outcomes is very rarely investigated. For example, the impact on students' basic psychological needs and subsequent quality of motivation could be mapped out in order to determine the overall effectiveness of new forms of assessment.

Conclusions

Creating an optimal motivational climate in PE is important, and assessment is a major challenge for many PE teachers. This makes it an interesting subject for professional teacher development. Nevertheless, there is a lack of theoretically grounded professional development programmes in PE that translate contemporary theories of assessment into practice. In collaboration with the PE community, we succeeded in developing a training programme that aimed at improving assessment practices in PE, with specific focus on students' psychological need-satisfaction. Teachers positively valued this approach and greatly approved of the practical applicability of theoretical concepts. Although overall the training programme was regarded as a meaningful point of departure to evaluate and enhance assessment practices we also identified some important barriers to implementation such as an increased workload, colleagues who are unwilling to change and some participants having difficulties in fully understanding all of the important theoretical aspects. Therefore, while practical tools, such as the MAMC in our study, facilitate bridging the gap between theory and practice, continued support through guidance and counselling (e.g. communities of practice, school–university partnerships) are essential in order

to successfully implement the training content in daily practice. The training programme in this study could be an important first step to improving PE teachers' expertise on motivating assessment practices.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by SIA RAAK under Grant 2012-14-15P.

Note

1. The Netherlands have various educational tracks in secondary school. Voorbereidend Middelbaar Beroepsopleiding (VMBO) is a four-year pre-vocational education and prepares students for senior secondary school vocational education programmes. Hoger Algemeen Voortgezet Onderwijs (HAVO) is a five-year track that prepares students for higher professional education. Lastly, Voorbereidend Wetenschappelijk Onderwijs (VWO) is a six-year track that prepares for university.

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