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Narelle Eather

University of Newcastle, narelle.eather@newcastle.edu.au

Nick Riley

University of Newcastle, nicholas.riley@newcastle.edu.au

Drew Miller

University of Newcastle, drew.miller@newcastle.edu.au

Bradley Jones

University of Newcastle, bradley.jones@uon.edu.au

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Evaluating the Effectiveness of Using Peer-Dialogue Assessment (PDA) for Improving Pre-Service Teachers' Perceived Confidence and Competence to Teach Physical Education

Narelle Eather
Nicholas Riley
Drew Miller
Bradley Jones
University of Newcastle

Abstract: Developing effective methods for improving student learning in higher education is a priority. Recent findings have shown that feedback on student work can effectively facilitate learning if students are engaged as active participants in the feedback cycle; where they seek, generate and use feedback in the form of dialogue. This novel study investigates the use of peer dialogue assessment as an assessment for learning tool used in an existing undergraduate physical education course. Our findings demonstrate that when thirty six undergraduate physical education students were provided with instruction and practice using peer dialogue assessment after consecutive teaching performances, they exhibit significant improvements in perceived teaching confidence and competence, and teaching self-efficacy. Process evaluation results implying that embedding peer dialogue assessment in higher education courses may be a feasible approach for facilitating learning, and that students were satisfied with using peer dialogue as a feedback method for improving teaching practices.

Background

Higher Education (HE) institutions are continually seeking ways to improve and maximise student learning within HE programs (McAleese et al., 2013), and the literature consistently promotes that the provision of feedback on performance is a fundamental component of the learning cycle (Adcroft, 2011; Carless, Salter, Yang, & Lam, 2011; Doan, 2013; Hattie & Timperley, 2007; Weaver, 2006). Furthermore, research supports that the provision of feedback is essential for facilitating reflection and development (Adcroft, 2011; Carless et al., 2011; Doan, 2013; Hattie & Timperley, 2007; Weaver, 2006). Feedback refers to the information that is provided to an individual about their performance of any action (Black & Wiliam, 1998), and can facilitate learning when it is used in ways that help close the gap between where a learner is placed and the intended outcome (Ramprasad, 1983).

Traditionally, feedback has been viewed under a cognitive perspective or a 'directive telling approach' where an expert (such as an academic) provides information to the passive recipient (such as a student) (Evans, 2013). In HE, providing written comments on a student's assignment or about a student's performance has been the dominant feature of feedback processes (Nicol, 2010). However, HE students across the globe are reporting that they do not receive written feedback on assessments that is helpful for their learning, and academics

report the burden of giving written feedback that is often not read or used (Adcroft, 2011; Boud, 2015; Carless, 2006; Carless et al., 2011; Kluger & DeNisi, 1996; L. McDowell, Smailes, Sambell, Sambell, & Wakelin, 2008; Nicol, 2010). Recent literature details that learning does not occur through the mere transmission of written or spoken information (one-way communication) or that feedback delivery on its own leads to learning (Nicol, 2009, 2010). Nicol suggests 'that for students to learn they must do something with transmitted information, analyse the message, ask questions about it, discuss it with others, connect it with prior understanding and use this to change future actions' (p.503). This line of enquiry takes a socio-constructivist view, where feedback is seen as facilitative (Archer, 2010). Although it is recognised that the quality of written feedback comments provided by academics is very important, the research also implies that the quality of the students' interaction with those comments is equally and perhaps, more important (Boud & Molloy, 2013). This pertinent issue has provoked renewed interest in what feedback is and how it can work effectively for facilitating student learning in HE courses (Boud, 2015; Hattie & Timperley, 2007; Long, 2014; Liz McDowell, Wakelin, Montgomery, & King, 2011).

The literature on assessment practices within HE also highlights the need for a transformation to enhance student learning (Carless et al., 2011; Shepard, 2000). Specifically, there is a call for academics to move away from traditional assessment procedures that are typically content-heavy, summative, and employ a norm-referenced approach; and use a more student-centred and constructivist approach that integrates assessment with learning (Ellery, 2008). When academics use summative assessments in HE courses (such as exams or presentations), students are rarely given an opportunity to use the feedback provided to develop their work within a given course (Long, 2014). Consequently, once-off assessment events provide little opportunity for effective learning through feedback (Ellery, 2008). In contrast, formative assessment tasks afford the greatest opportunities for learning, especially when students are given multiple opportunities to receive feedback and to actively engage with the feedback to improve in subsequent performances (Ellery, 2008). Therefore, investigating novel ways to facilitate student learning through active participation in the assessment - feedback cycle within the current context of HE programs is warranted.

The evidence to support that students appreciate and want good feedback to improve their skills is building (Higgins, Hartley, & Skelton, 2002; Orsmond, Merry, & Reiling, 2005). However, the literature also highlights that students seek feedback that they can understand (Orsmond et al., 2005), that includes strategies for improving performance in the future (Duncan, 2007) and is provided in an enabling environment (rather than as a judgement) (Weaver, 2006). Consequently, peer feedback is becoming increasingly popular in HE courses as a pedagogical strategy for improving student outcomes with evidence of peer assessment being used to promote student self-regulatory practice (Brown, 2010; Cartney, 2010; Nicol, 2010; Rust, 2007; Sadler, 2010). The use of peer dialogue as a form of feedback on performance to improve learning in HE programs is a novel assessment for learning strategy. It has demonstrated success in promoting learning within clinical settings (Bok et al., 2013; Molloy & Boud, 2013; Nicol, 2010) and is an approach that warrants investigation within different disciplines (e.g., pre-service physical education teacher education programs) (Bok et al., 2013; Carless et al., 2011; Molloy & Boud, 2013; Nicol, 2010).

Peer dialogue assessment (PDA) sits within the socio-constructivism paradigm and positions learners as active participants in the feedback cycle, where they seek, generate and use feedback in the form of dialogue (or verbal discussion) provided by peers to self-regulate performance on future tasks (Evans, 2013). Typically, in PDA, students observe their peers during a task and engage in a structured conversation about their performance. The students observing a performance stimulate the dialogue by asking questions that elicit rationalised

responses and justifications regarding the observed performance. This process facilitates a deeper understanding of content knowledge, stimulates higher order thinking skills and keeps students accountable for their preparation. Pilot studies reported that PDA is well-received by students as it promotes self-directed learning and enhanced student self-evaluative abilities - especially when multiple opportunities are provided for students to use PDA to improve subsequent performances (Molloy & Boud, 2013; Tschannen-Moran & Woolfolk Hoy, 2001). Cartney (2010) conducted an exploration into the value of peer assessment as a formative and formal 'assessment for learning' strategy for use in HE, but also included dialogue between students and tutors and written feedback in their feedback process. Although the Cartney study was based in social work and involved a sample of undergraduate social work students, the dialogical feedback processes were implemented in the current study. Cartney found that participants recognised the professional benefits of sharing knowledge and ideas with peers as essential for future professional as well as academic development (Cartney, 2010). The preliminary evidence indicates that PDA has the potential to be an effective and sustainable learning strategy utilised within assessment practice for students in HE programs, but PDA has yet to be trialled in the context of teacher education programs (Bok et al., 2013; Gibbs & Simpson, 2004; McLaughlin & Simpson, 2004; Molloy & Boud, 2013; Nicol, 2010; Tschannen-Moran & Woolfolk Hoy, 2001).

The use of PDA to improve professional and academic practices within teacher education programs has not been investigated. Using social-learning theory (Bandura, 1977), it could be suggested that teachers who have confidence in their ability to teach physical education will employ a greater variety of teaching strategies and be more successful in facilitating the achievement of student outcomes in school physical education lessons. Consequently, the impact of improving the teaching competencies of physical education teachers may be far reaching. Given that the majority of young people are exposed to regular physical education through their schooling years and that teachers of physical education have a significant impact on the student experience; a physical education teacher's competence can significantly impact on the well-being and development of children and adolescents in the physical, affective, social, and cognitive domains in the short and long term (Bailey et al., 2009; Dudley, Okely, Pearson, & Cotton, 2011; Institute of Medicine, 2013; Jenkinson & Benson, 2010; P.J. Morgan & Hansen, 2007; Society of Health and Physical Educators, 2010). It could be anticipated that the development of HE physical education courses that facilitate reflection and learning will improve the skills of physical education graduates – potentially leading to the delivery of higher quality physical education courses and more positive outcomes for school children. Consequently, there is a need for HE institutions to ensure that teacher education programs produce physical education graduates who have the skills and confidence to implement high quality physical education programs in schools. As such, opportunities to improve pre-service teacher's competencies in teaching physical education should be explored within existing HE courses to enhance learning and future teaching quality.

The aim of this pilot study is to evaluate the effectiveness of using PDA for improving undergraduate physical education students perceived teaching confidence and competence, and teaching self-efficacy. *It is hypothesised that perceived confidence and competence, and self-efficacy of undergraduate physical education students will improve as a result of completing an undergraduate course with PDA embedded.* Participant engagement and satisfaction of PDA as an assessment for learning tool will also be assessed and discussed.

Methods

Design

Ethics approval for the study was obtained from the University of Newcastle, NSW, Australia, and consisted of a single group repeated measures design.

Participants

For this pilot study a convenience sample was used whereby all undergraduate Bachelor of Teaching (HPE) (Hons) students from the University of Newcastle, Australia, enrolled in PE Studies 4 (Invasion Games) in semester 2, 2015, were invited to participate. In accordance to ethics guidelines, an independent 3rd party (other than the research team) was responsible for recruiting participants and for administering the questionnaires to minimise coercion. Those students with informed signed consent were eligible to complete assessments, but all students enrolled in the course completed the standard coursework. PE Studies 4 is a mandatory course that involves the development and application of a student's pedagogical knowledge and skills relating to a range of invasion games; with a specific focus on developing teaching competencies in football codes, such as soccer, touch football, Oztag, rugby league, rugby union and Australian football.

PDA Conditions

Week 1: The participant students were introduced to the concept of PDA as a component of the first lecture of the 12-week course (one semester). Students were informed of how PDA can be used as a learning tool to improve their teaching practices and were given written examples of how PDA can be structured within the context of physical education. The information provided to the students was based on applying PDA to improve perceived competence and confidence to teach invasion games.

Week 2-8: Students were given the opportunity to build their skills in stimulating dialogue to provide feedback on teaching performance within selected practical tutorial activities (approximately 15 minutes each week). This dialogue was facilitated by the University tutor who was also a member of the research team, and was guided by an instructional framework (Miller et al., 2016) and the SAAFE teaching principles (Supportive, Active, Autonomous, Fair and Enjoyable) (Lubans et al., 2012) outlined in Table 1.

Instructional framework (OMG TEST)			SAAFE teaching principles
O	Teacher organises the groups quickly	Supportive	1. Teacher provides individual skill specific feedback 2. Teacher provides feedback on student effort and involvement 3. Teacher promotes positive interactions between students
M	Teacher moves students into the GO position efficiently	Active	1. Activities involve small-sided games or tabloids involving all students 2. Equipment is plentiful and developmentally appropriate 3. Transitions between activities are efficient
G	Teacher gives instructions and demonstration simultaneously	Autonomous	1. Some activities incorporate multiple challenge levels 2. Students are given choices about the tasks and activities 3. Students are involved in the set-up, decision-making or running of activities
T	Students try the game / activity	Fair	1. Teacher ensures that students are evenly matched in activities 2. Teacher acknowledges and rewards good sportsmanship 3. If necessary, teacher modifies activities to maximise opportunities for success
E	Teacher is observing and evaluates the game - providing individual / group feedback where appropriate	Enjoyable	1. Lesson starts with an enjoyable activity and concludes with an enjoyable experience 2. Activities are meaningful, appropriate and not repetitive 3. Lessons involve a wide range of appropriate activities (based on the lesson focus)
S	Stop! The teacher stops the game to modify the game or attach learning to the activity		
T	Transition to the next activity is smooth and efficient		

Table: 1 Instructional framework for organising games and SAAFE Teaching Principles

Week 9-12: The students participated in a 4 week in-school teaching program (1.5 hours per week) where they worked in teams of four (2 x pairs) to plan and teach secondary school physical education for 45min and to observe their partner peer group teaching for 45 minutes each week. The students were required to use PDA at the completion of each of the four concurrent teaching sessions to provide feedback to their respective peer group (approximately 10-15 minutes per session).

Measures

In order to evaluate the efficacy of the PDA intervention for improving pre-service teachers' confidence and competence to teach physical education, and teaching self-efficacy the following measures were undertaken at pre and post intervention:

1. A purpose designed questionnaire was completed by participants at baseline and at follow-up (15 weeks). The questionnaire was based on previously used and published scales (adapted to suit the teaching of physical education and invasion games in secondary schools) to determine participant:

- a. *Competence to teach PE* (P. J. Morgan & Bourke, 2005; P. J. Morgan & Bourke, 2008) and competence to teach invasion games: twenty two (22) self-report items rating general competence to teach PE (11 items) and competence to teach invasion games (11 items) were given using a 5-point Likert scale ranging from 'Not Competent at all' to 'Completely competent' (e.g., *Lesson planning for PE.....*).
- b. *Confidence to teach PE* in general (Hand, 2014) and confidence to teach invasion games: twenty eight (24) self-report items rating confidence to teach invasion games were given using a 5-point Likert scale (24 items) ranging from 'Not Competent at all' to 'Completely competent' (e.g., *My ability to explain game sense concepts relating to skilful movement and game play in invasion games.....*) and four (4) open-

- ended questions (e.g., *please indicate the factors that most influenced your current level of confidence in teaching invasion games*).
- c. *Self-efficacy to teach* (Tschannen-Moran & Woolfolk Hoy, 2001): twenty four (24) self-report items rating confidence to teach invasion games were given using a 5-point Likert scale (24 items) ranging from 'Not at all' to 'A great deal' (e.g., *How much can you do to get through to the most difficult students?*)
2. In order to evaluate the quality, quantity and relevance of PDA group discussions participants were asked to move to a private area at the end of each teaching session to discuss their teaching performances and to audio record the sessions (using the provided iPad). The recordings were uploaded after each session and then transcribed and entered into a database at the completion of the study.
3. *Process evaluation*: The feasibility of the programme was examined using a number of measures. Measures of recruitment (evaluation of the recruitment process, dissemination of information and obtaining informed consent), retention (measure of how many students completed the program and participated in all assessments pre- and post-intervention), adherence (evaluation of the degree to which participants followed the PDA program) and satisfaction (level of satisfaction and engagement with PDA as a learning tool) were used. Participants were asked to provide written and / or verbal feedback (audio recorded) regarding PDA as an assessment tool for use in the pre-service secondary teacher education programs via 4 open-ended questions (e.g., *What did you like / dislike about PDA as a learning tool for undergraduate PE teachers?*, *Did you find the feedback provided to you by your peers to be useful?* *Do you think that using PDA over several weeks has helped you to develop your teaching confidence and competence?*).

Statistical Analysis

Statistical analyses were conducted using repeated measures t-test in PASW Statistics 22 software; and Cohen's d effect size was calculated ($d = \text{mean difference in change scores} / \text{pooled variance}$) and interpreted as: .20 = small, .50 = moderate and .80 = large effect. All missing data was dealt with using an intention-to-treat approach and baseline scores brought forward.

PDA discussions were audio-recorded, transcribed by an independent company, and then entered into a database. Transcriptions were then analysed based on the SAAFE teaching principles (Lubans et al., 2012) and the instructional framework (Miller et al., 2016) outlined in Table 1. Using a recursive approach, quotes with similar meanings were grouped together under the appropriate principle and / or theme (Whitehead & Biddle, 2008).

Findings

Questionnaire Results

In summary, the PDA study involved 36 undergraduate students enrolled in the pre-service teacher education course PE studies 4 Invasion Games (mean age 21.81 ± 1.71 years; 52.8% female) at the University of Newcastle, NSW Australia. All invited students consented to participate in the study and baseline scores are presented in Table 2.

Demographic Information			
Sex		Age	
females	males	Mean	sd.
19	17	21.81	4.71
Outcomes			
Outcome	Maximum	Mean	Std. Dev
Perceived competence to teach PE in general	55	36.36	4.80
Perceived competence to teach invasion games	55	38.94	5.67
Confidence to teach invasion games in PE	120	81.75	8.50
Teaching self-efficacy	120	86.56	9.16

Std. Dev = standard deviation; n=36 ; PE =physical education

Table 2: Baseline data (Australia, November 2015)

In this study, significant improvements in undergraduate physical education student's self-reported teaching competence, confidence and self-efficacy were demonstrated. There was a significant difference and large positive effect in the scores for: *perceived competence to teach physical education in general* at baseline (M=36.36, SD=4.80) and follow-up [(M=45.31, SD=3.88); t(35)=10.79, p <.0001]; *perceived competence to teach invasion games* at baseline (M=38.94, SD=5.67) and follow-up [(M=46.14, SD=4.59); t(35)=6.29, p <.0001]; *confidence to teach invasion games* at baseline (M=81.75, SD=8.50) and follow-up [(M=98.67, SD=8.44); t(35)= 8.47, p <.0001]; and *self-efficacy* to at baseline (M=86.56, SD=9.16) and follow-up [(M=93.61, SD=8.08); t(35)=4.43, p <.0001] (Table 3).

Outcome	Paired Differences								
	Mean change	Std. Dev	Std. error mean	95% CI of the Difference		t	df	d	P
	score			Lower	Upper				
Perceived competence to teach PE in general	8.94	4.97	0.83	7.26	10.63	10.79	35	2.08	.000
Perceived competence to teach invasion games	7.19	6.87	1.14	4.87	9.52	6.29	35	1.42	.000
Confidence to teach invasion games in PE	16.92	11.98	2.00	12.86	20.97	8.47	35	2.03	.000
Teaching self-efficacy	7.06	9.56	1.60	3.82	10.29	4.43	35	0.83	.000

Std. Dev = standard deviation; n = 36; PE = physical education; df = degrees of freedom; P = p-value of significance; Mean change score = mean follow-up minus mean baseline; *d* = *Cohen's d effect size*

Table 3: Repeated measures questionnaire results (follow-up – baseline) (Australia, November 2015)

PDA Themes

PDA audio files were transcribed and analysed for themes based on the instructional framework for organising games and SAAFE Teaching Principles presented in Table 1. It was apparent that some students had difficulty framing the discussions using questions, with many using comments and questions together. There were 141 discussion points extracted from the audio files and a breakdown of the content themes and major focus points are presented in Table 4.

Theme	n	Focus Points
Supportive	15	Use of feedback during teaching Improving transition time
Active	47	Minimising instructional time Involving all students in class activities
Autonomous	7	Self-selection of groups Student's contribution to changing the rules of a game
Fair	27	Changing the rules, set-up of a game, and organisation of teams to make the game fair for all Implementing changes to rules, activity organisation / structure to minimise boredom or maximise success
Enjoyment	14	Outlining the significance of the game Improving the motivation of students
OMG-Test	26	Minimising transition time
Behaviour	5	Engaging disengaged students in lesson activities
Total	141	

Table 4: PDA Themes (Australia, November 2015)

Transcription analysis revealed that specific themes were more popular during PDA sessions. During the undergraduate physical education course, students were given instruction and practice using the instructional framework and SAAFE teaching principles (outlined in Table 1), yet the analysis highlighted that the majority of dialogue focused on the 'Active' principle. PDA sessions were dominated by discussion around increasing active learning time during activities, minimising transitional time and changing the organisation or rules of a game to improve either: activity levels, enjoyment or fairness for students. Possibly, the undergraduate physical education students in this study: 1) believe that maximising active learning time in physical education is central to providing a quality lesson; 2) believe that improving active learning time is an area that needs greatest improvement; or 3) feel most confident to provide feedback on this topic.

Process Evaluation Results

The feasibility of embedding PDA in an existing undergraduate physical education course was confirmed. Our evaluation revealed a *recruitment rate* of 100% (with all thirty-six students enrolled in PE Studies 4 agreeing to participate); very high *retention* (with 94.40% of participants completing follow-up assessments at 15-weeks); and excellent program *adherence* (with all eight university tutorial sessions and four in-school visits being conducted and participant attendance at the tutorial sessions and in-school visits being 86.80% and 97.92% respectively). It should be noted that embedding the PDA in an existing

physical education course may impact on retention and adherence results. *Satisfaction* comments (written or audio recorded) collected at the completion of the study also revealed that the participants generally found PDA to be a useful tool for learning in physical education and provided positive feedback for the use of PDA for improving teaching competence and confidence over the four-week teaching block. For example:

Q2) Did you find the feedback provided to you by your peers to be useful?

“..I found it useful....others can pick up on what you're not doing or not doing, as well and areas that you can improve on”, “I think the different perspective and different points of view make it a very well rounded tool”, “Yes, goodness. ... I did find it helpful... I thought about my practice more critically, like what I can do to improve the engagement of kids, what can I do to improve the game sense”, “Yes.. learning different ways to do things.... reflecting from fellow students-teachers to evaluate each other and improve”, “It was good to hear our peers’ point of view....very useful because others see things you may have missed and it is good to bounce ideas off each other” and “We're all colleagues as well and we're all mates, so we are going to take the time to actually listen and take in what our mates are saying. Because they're doing it for our benefit and we're doing it for their benefit.”

Q3) Do you think that using PDA over several weeks has helped you develop your teaching confidence and competence?

“I think for me it's definitely improved my confidence, not having a sport background. I used to be scared to teach sports. So I guess this has helped me because I've been able to collaborate with other peopleand get feedback from them about how to teach, how to engage people, make improvements to my own lesson design. I've found that really helpful”, “PDA has helped my teaching confidence and competence as I was able to use the positive feedback to gain confidence as the weeks progressed”, “I think it has definitely helped. Each week you can build on it. The mistakes you might have made or where improvements could be made the week before, you change it up...build on it each week. We're all colleagues as well and we're all mates, so we are going to take the time to actually listen and take in what our mates are saying. Because they're doing it for our benefit and we're doing it for their benefit”, “Improved confidence, organisation skills and gave opportunity to practice teaching in a school environment”, “I think that PDA has definitely improved my confidences and competences (how I can make activities better as well as teaching strategies for different situations)... it has given me the opportunity to develop through the weeks on areas that I would not have been able to identify over a one-off assessment.”

Q4a) What did you like about PDA as a learning tool for undergraduate PE teachers?

“Getting good constructive feedback”, “Very relevant to teaching”, “Learning to give and receive feedback to improve our teaching”, “I just really like it. What I like is just get into a discussion at the end. You see people's reasoning behind what they did”, “I think it's a great tool. I think you're more likely to cover things that you wouldn't in a written report, just purely because you're talking about it and asking questions and interacting with each other”, “It was useful ... gave us an opportunity to develop and see things that we don't see while teaching”, “One question leads to another which leads to another and you've got a full discussion....you usually cover everything you need rather than just a set criteria,” “It really opens up your way of thinking, ... how can I change this so it's better for next time....made me think about modifications and adaptations”, “It was great getting feedback straight away after the lesson to prepare for the next lesson”, “It was a hands-on development process rather than just information,” “...the first time I've ever liked working with a group ever,” “....it's a very positive way of bringing up things.”

Q4b) What did you dislike about PDA as a learning tool for undergraduate PE teachers?

Only two responses given: “I found it a bit tricky. It was hard to make them questions.....instead of comments”, “Sometimes comments or facts are given rather than constructive feedback or discussion.”

Discussion

This novel study demonstrates the effectiveness of using PDA for improving self-reported teaching competence, confidence and self-efficacy in a sample of undergraduate physical education students. This study also shows that students were satisfied with the use of PDA as a strategy for providing feedback on their teaching performances and that it was a feasible tool for use within an existing HE course.

Given that a teacher's perceptions of his or her ability to teach and confidence to teach physical education may be directly related to the attainment of important student outcomes (Bandura, 1977), our positive findings regarding teaching competence and confidence are promising. Similarly, our findings regarding teaching self-efficacy are important because the research highlights that teachers who have high levels of teaching efficacy (a judgment of his/her capabilities to bring about desired outcomes of student engagement and learning (Tschannen-Moran & Woolfolk Hoy, 2001), are more capable of using multiple instructional strategies effectively, more capable of facilitating student participation, more successful in classroom management skills, make more efforts to overcome the problems they face, and are more likely to be open to new ideas and to develop positive teaching attitudes (Ozder, 2011). Consequently, developing high levels of perceived competence and confidence to teach physical education, and self-efficacy to teach, is important for a pre-service teacher's success in future teaching roles. This study builds on previous work by Morgan and Bourke (2005), where the authors found a strong relationship between teachers' training in physical education and their perceived confidence to teach physical education (P.J. Morgan & Hansen, 2007), by developing an undergraduate physical education course that successfully improved student's perceived competence.

The positive results and comments received by students in this study may be attributed to the structure of the physical education course in which PDA was included. Students were given four consecutive teaching opportunities in a school; enabling them to practice providing PDA and to use the feedback provided by peers during PDA sessions to strengthen teaching practices. Similarly, embedding instruction about the effective use of PDA within an existing undergraduate course, providing a framework for structuring dialogue and providing practice opportunities using PDA prior to the in-school visits was essential for ensuring that the quality of the feedback provided by peers was maximised. Traditionally, teacher education programs in HE generally focus on developing pedagogical and subject content knowledge; skills and attitudes necessary for effective teaching; and capacity for reflection and ongoing learning in pre-service teachers (Institute of Medicine, 2013; Sims, 2006; Tsangaridou & O'Sullivan, 1994). Early work by Zeichner and associates, endorses that the ability to think about why and what one does is vital to intelligent teaching practice, and that developing reflective teachers is essential (K. Zeichner, 1987; K. Zeichner & Liston, 1987; K. Zeichner & Tabachnick, 1991). However, in the context of HE teacher education programs, investigations of effective strategies to enhance reflective practices is limited - especially in the field of physical education (Standal & Moe, 2013). General education and discipline-specific literature outlines that feedback is a key element of student learning, where a student's performance is expected to improve as a result of receiving, understanding and acting on feedback provided (Adcroft, 2011). The effectiveness of feedback on learning is primarily built on the assumption that high quality feedback can be

used to improve future performances. However, students and staff in HE report dissatisfaction with the effectiveness of current methods of providing feedback for facilitating learning; often as a result of poor practice, a disparity in understanding and expectations of feedback between academics and students, students not using the feedback provided to improve performance, or lack of opportunity to use feedback due to one-off and varied assessment schedules (Burke, 2009; Evans, 2013; Vardi, 2009). Given that feedback is a mechanism for changing the behaviour of students as they learn, creating a stimulating learning environment where the feedback process serves to promote self-reflection and self-development in undergraduate physical education programs may hold potential (Adcroft, 2011).

In the current study, the students also provided positive comments regarding the use of peer feedback and indicated that they appreciated the immediate, 'hands-on' and positive nature of the PDA sessions; and that they valued and respected the different perspectives provided by their peers. These results align with the work of Bok et al. (2013), who state that learners are more receptive to judgement when it is provided by people who they trust and who seem to have their best interests at heart; and is provided in conditions that enable productive behaviours in learning (Carless, 2006). Additionally, the benefits of engaging undergraduate physical education students in PDA move beyond the potential improvements in subsequent teaching performances; but also include an increased capacity for evaluating their work and for generating a teaching graduate committed to ongoing learning (Molloy & Boud, 2013). The development of these attributes may have far reaching and important implications for children participating in school-physical education programs in the future.

Aligning with previously work using peer-dialogue within the HE context by Cartney (2010), we also found a disparity between the way some students had embraced the feedback exercise, and in the quantity and quality of feedback provided. In both studies, there was large variation in the focus and quality of dialogue between groups, with some students reporting difficulties in facilitating dialogue through questioning (rather than providing comments) (Cartney, 2010). Frequently, the students who observed a teaching session provided comments about the strengths and weaknesses of the teaching performance, which was not only directive in nature, but did not stimulate useful dialogue or promote critical analysis from the performer (e.g., "You both gave awesome positive feedback, both individually and to the group as a whole," or "We just felt that your ... explanation took a bit too long"); implying that further instruction and training may be needed to ensure that students are adequately prepared to conduct effective PDA sessions. On the other hand, many students embraced the PDA sessions and used them as an opportunity to learn by asking relevant and thought-provoking questions (e.g., "What methods did you consider in minimising transition times and do you think they were effective?" and "Was there a reason for choosing one group for the numbers game?"). In Cartney's case study however, participants reported elevated levels of anxiety and anger during peer-assessment when the assessment outcomes were linked to success in the course and when peers did not engage in the feedback process fully. Based on these findings, PDA was not formally linked to student success in their university course in the current study, but was implemented as an informal assessment tool for facilitating learning – eliminating the emotional component (see process evaluation comments below).

Limitations

Although the strength of this study is its novelty, the single group repeated measures design does not provide conclusive evidence for the implementation of PDA in preference to

other assessment tools in HE physical education courses. Future randomised controlled trials involving comparison groups are needed. The small sample size limits the generalisability of the findings and is also a limitation for noting.

Investigating why PDA sessions were dominated by specific elements from the PE teaching frameworks (i.e., increasing active learning time during activities, minimising transitional time and changing the organisation or rules of a game) was beyond the scope of this study but warrants further investigation in future studies. Furthermore, this study was not powered for a sub group analysis, meaning that we were unable to determine whether a relationship existed between participant outcomes and quality of PDA sessions; however this is also suggested for future investigation.

Conclusion

The effective use of assessment and feedback in HE is an area of emerging interest and preliminary evidence supports the use of dialogue in peer assessment to support learning in both formal and informal situations. This assessment method has only recently been discussed in the field of education and the findings from this study provide a foundation for further research in an area of need – the provision of quality education programs built around evidence-based learning opportunities in HE education. Furthermore, embedding current practices and innovative teaching methods in teacher education courses is a sustainable approach that will provide additional opportunities for students to gain the confidences and competencies required in future employment. The results of this study may also help inform future assessment practices within HE courses; both in physical education and in other disciplines.

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