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EPER

European Physical Education Review
2020, Vol. 26(1) 70–84
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DOI: 10.1177/1356336X19826603
journals.sagepub.com/home/epe
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# Flipped learning, pedagogy and digital technology: Establishing consistent practice to optimise lesson time

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## Abstract

Flipped learning (FL) is a pedagogical approach that has scarcely been examined in physical education (PE). As a result, we have little information regarding what PE teachers think of the approach, how they apply it, or what perceived value it has for their teaching. This research explores the reasons which two UK-based PE teachers gave for why and how they used FL to complement their use of digital technology (DigiTech). Their experiences and views are explored through a case study/appreciative inquiry approach. Data were generated from: (a) interviews with the teachers; (b) lesson observations and field notes and (c) document analysis, all of which were analysed using grounded theory. The findings showed that each teacher used FL and DigiTech in nuanced ways to support their teaching. Despite personal differences, FL was established by both teachers as a consistent routine of practice to support the use of DigiTech. The teachers' rationales for using FL hinged on their belief that: (a) it optimised the lesson time in which students could be physically active and (b) it supported their examination PE students. Overall, the results indicated that, when used in conjunction with DigiTech, FL has the potential to pedagogically support teachers' teaching of PE. This is particularly pertinent given the limited time allocated in the curriculum to PE (some of which is inevitably lost in the changing rooms) and the perceived need for students to be physically active in lessons.

## Keywords

Physical education, flipped classroom, teachers, teaching, technology-enhanced learning, ICT

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## Introduction

Interest in flipped learning (FL) has rapidly increased in line with growing challenges for educators to find new pedagogical strategies for engaging students and increasing the effectiveness of the learning process. Despite growing interest, there is little academic discussion around, or a single definition and framework for, the FL approach (Abeysekera and Dawson, 2015). However, FL has generally been characterised as a pedagogical approach that moves information-transmission teaching out of class and uses class time for learning activities (The Flipped Learning Network, 2014). It also requires students to complete pre- and/or post-class activities to fully benefit from in-class work (Tawfik and Lilly, 2015). We know, from studies such as Steen-Uthiem and Foldnes (2018), that students report a more positive learning experience and higher engagement when involved in a flipped classroom. Furthermore, evidence suggests that FL can support students with problem-based learning because artefacts, such as video resources, can be used to scaffold their problem-solving activities (Tawfik and Lilly, 2015). Given that there is no agreed framework for FL, and that FL is adapted and applied in different contexts, it is important to explore its uses in subject areas like physical education (PE).

Considering how and why FL is used in PE will allow us, as a field, to begin to understand what this approach looks like and ascertain the value (if any) it has for teaching and learning. If we do not explore pedagogical approaches such as FL, then we are in danger of recycling traditional approaches to teaching that do not keep pace with innovations and pedagogies in the broader field of education. This paper seeks to address gaps in the literature by exploring how and why PE teachers use FL. In doing so, we seek to build a picture of how FL is applied in PE and the benefits it may afford to teaching and learning.

## Flipped learning

The term 'flipped learning' (also referred to as a 'flipped classroom') is used to describe a pedagogical approach in which the conventional notion of classroom-based learning is inverted. As Bergman and Sams (2012) highlight, there is more than one way to implement an FL approach or, put differently, there is no such thing as *the* flipped approach. That said, if teachers implement it differently, how can we characterise FL? Bergman and Sams (2012) contend that the one unifying characteristic of the flipped approach is the desire to redirect attention in a classroom away from the teacher and onto the learner. In contrast to the traditional, lecture-based instructional approach, FL occurs in two phases of instruction that are 'flipped' or inverted (The Flipped Learning Network, 2014). The first phase is the pre-class learning where students acquire basic and foundational learning materials before class. To do this, the teacher creates or selects engaging learning resources to provide students with key information, information that tends to be explored outside of school. Such learning materials are not required to be delivered through DigiTech, but digital videos, for example, have been the common means of delivering flipped material (Bergman and Sams, 2012). The second phase occurs in the classroom, where students engage in student-centred learning activities that centre on them and their out of school learning, e.g. peer discussion, quizzes or problem-solving activities facilitated by the teacher (The Flipped Learning Network, 2014). Because FL allows key material to be explored prior to the lesson time, classroom time is freed up for activities that deepen students' understanding (Sharples et al., 2014).

As a pedagogical approach, FL has been gaining momentum in higher education (Brewer and Movahedazarhouligh, 2018). Research studies exploring the use of FL in higher education have

shown how it increases student engagement (Sharples et al., 2014), reinforces real-world application of DigiTech (Doyle, 2015) and helps students to learn the subject content (Love et al., 2014). However, the literature exploring this pedagogical approach is still in a nascent stage (Steen-Utheim and Foldnes, 2018). This lack of research means that FL is currently an emerging pedagogical approach that is 'under-evaluated, under-theorized and under-researched' (Abeysekera and Dawson, 2015: 2). Research that focuses on who benefits from FL, in what ways, and in what contexts FL is appropriate, would help educators understand some of the ways in which they may consider the use of such an approach in their practice (Kim et al., 2014).

The embryonic literature around FL in education is mirrored in PE. Bergman and Sams (2012) reported that teachers used FL to explain the rules of new games and activities to students. In discussions of an unpublished pilot study conducted in Norway with 200 secondary school students, Østerlie (2016) indicated that students self-reported that they learned more when FL was used than in their regular PE classes. More recently, Østerlie (2018) found that FL positively influenced the motivation of adolescents, especially that of girls, to participate in PE. In a university setting, Killian et al. (2016, cited by Østerlie, 2018) reported that FL had a positive impact on the time students spent on practical activities whilst extending feedback given by teachers. We can postulate from studies such as these that teachers have tended to use videos as the main form of delivery for out of classroom activities, i.e. tasks that do not require the teachers' physical presence. The use of videos, in turn, gives more class time to extra activities that can be enhanced by the teacher. Whilst the use of video is a common tool for creating extra in-class time, the time itself is used in myriad ways depending on the subject matter, location or style of teaching (Bergman and Sams, 2012). For example, students in Reddan et al.'s (2016) study engaged in class activities such as quizzes and small group discussion, whereas students in Østerlie's (2018) study used peer and individual student–teacher and student–student discussions.

Given the reported sparsity of knowledge about FL in PE, it is important to gain a greater understanding of its use. This knowledge is particularly important considering the pedagogical uses of DigiTech to support students' learning are not yet clear within either PE or the broader field of sport pedagogy (Cushion and Townsend, 2018).

## *Digital technology and flipped learning*

The use of DigiTech to support teaching and learning in education has grown dramatically in recent years. It is therefore unsurprising, given its increasing accessibility in both school and home contexts, that DigiTech has commonly been used as 'the vehicle' to deliver FL. Exploring both pedagogical and technological strategies that support students' learning in PE is particularly pertinent given, among other things, the limited time allocated in the curriculum to PE (some of which is inevitably lost in the changing rooms (O'Donovan and Kirk, 2007)) and the perceived need for students to be physically active in lessons (Cale et al., 2016). Indeed, increasing pressure on teachers to engage with DigiTech and, as a result, be seen to meet the needs of 21st century learners, whilst simultaneously ensuring that students are physically active, creates a dichotomy that needs to be better understood. In short, a more complex understanding of pedagogy and the places where learning, teaching and context converge with DigiTech is required (Bodsworth and Goodyear, 2017; Casey et al., 2017b; Lupton, 2015).

FL is just one pedagogical strategy that can be used as a lens through which to explore the scant knowledge that the field has about how DigiTech is being used by teachers to support young people's learning (Casey et al., 2017a). Given the scarcity of literature, up-to-date research is

required that investigates both the practical realities of teachers' DigiTech use in PE and to understand what teachers find pedagogically beneficial.

In light of this background, this paper seeks to better understand and explore how and why teachers reportedly combine the pedagogical approach of FL with DigiTech in PE. By exploring the realities of PE teachers' practice and seeking to better understand 'what works' for them, we aim to increase the attention in the literature afforded to what PE teachers think, say and do with FL and DigiTech. This paper, therefore, contributes to contemporary research by providing pedagogical examples of practice using FL and DigiTech in PE. As a result, this paper enhances knowledge and understanding of a pedagogical approach that has been scarcely examined by scholars in the field.

## Methods

### Ethics

This research was approved by the Loughborough University Human Ethics Committee. Participants were given an information sheet and provided informed consent prior to the start of the study.

### Participants and settings

This study involved two UK PE teachers (age 30–35). These teachers were selected based on their self-identified use of DigiTech. Patrick (pseudonym) works in a community college (11–18 years) in the North of England. He is the head of the PE department and, at the time of the study, had been teaching for 10 years. The school's vision is underpinned by DigiTech and all teachers are encouraged to use it to support teaching and learning. Each pupil in Year 7 is given an iPad with the aim of eventually rolling this out across the school.

Dillon (pseudonym) works in an academy[1] school (11–18 years) situated in central England. He is also head of the PE department and had taught for nine years. Whilst the school did not have any school-wide DigiTech initiatives in place, the PE department have invested in DigiTech devices such as iPods, a television screen and iPads/stands. Neither teacher had any formal training or qualifications in FL at the time of the study.

### Case study and appreciative inquiry

A qualitative case study approach guided this study. For our purposes, case studies were appropriate because they allowed us to better understand the way each teacher used FL and DigiTech. Specifically, they allowed us to focus on how and why Patrick and Dillon used FL and DigiTech and, by using different data gathering methods, explore this use in depth. The case study approach was underpinned by appreciative inquiry, which is viewed as a philosophy rather than a specific set of techniques or methods (Enright et al., 2014; Watkins and Cooperrider, 2000). From this perspective, appreciative inquiry can be viewed as an orientation grounded in identifying strengths rather than weaknesses and is underpinned by the belief that every culture, and every person in that culture, has strengths that can be explored.

Building upon the emergent work of Gray et al. (2019) and Pill (2015), our application of appreciative inquiry drew upon the '4-D' (discovery, dream, design and destiny) cycle (Cooperrider and Whitney, 2005):

**Discovery:** Participants identify, reflect on and discuss the reasons why they believe practice has worked 'best' or 'efficiently'.

**Dream:** Participants are asked to imagine themselves, their group or their community at its best and attempt to identify what could be.

**Design:** Having identified common aspirations or a common dream, participants are questioned to explore what the ideal situation would be.

**Destiny:** Researchers explore and work with participants to investigate how practices could be sustained.

Due to the nascent literature on FL and DigiTech, we focused our attention more on the discovery phase.

## *Data gathering*

Data were gathered by the first author, using a variety of qualitative methods: (a) four themed interviews guided by appreciative inquiry and two follow up interviews; (b) school visits involving lesson observations and field notes; and (c) document analysis. These methods were used to understand the use of FL and DigiTech.

*Appreciative inquiry interviews.* Four semi-structured interviews guided by appreciative inquiry were conducted, individually, with each teacher. Each interview, on average, lasted 75 minutes and explored different topics. There were some variations in the questions and structure of the interviews.

Interview one studied each teacher's view of DigiTech and subjects such as the role and value of DigiTech in their lives and what they used DigiTech for. Interview two focused on each teacher's school context and their view of DigiTech for teaching. Example topics of discussion included the development of their DigiTech use and experiences and factors that influenced their use of DigiTech. Interview three sought to understand the position of DigiTech in the teacher's practice. This interview investigated the teacher's views of PE and the role of DigiTech in their delivery. Interview four investigated how their practices could be developed further and how they could be sustained.

The questions were open-ended. This allowed the teacher to answer in the manner they deemed most relevant and appropriate to their experiences. Elaboration and clarification probes were used to ensure comprehensive descriptions were elicited and to ensure the interviewee could confirm and build upon the first author's understanding of their views (Gratton and Jones, 2010). Following the first author's visits to the schools, a second phase of interviews was conducted. Patrick and Dillon were each interviewed an additional two times. The purpose of these interviews was to further explore each teacher's views about, and their use of, DigiTech in more detail. These interviews were especially useful given the first author's enhanced understanding of each teacher's school and context following the observation visits. These interviews were tailored to each teacher and lasted an average time of 60 minutes.

*Lesson observations and field notes.* Observations of lessons were used to get close to the social practices of 'everyday' situations (Öhman and Quennerstedt, 2012) and to gain first-hand impressions of ongoing practice that could not be achieved through interviews alone. Each

teacher determined the class for observation and the first author adopted the role of a non-participant observer. She was made known to the students but did not actively participate in the lesson. The first author observed one of Patrick's lessons and three of Dillon's. The observations of skills, practices and conversations were recorded through field notes with the intention of gaining a deeper understanding of what was said and done. Field notes were also used to record the researcher's experiences during and after school visits and informal conversations. These were recorded in a mixture of written and/or audio formats. The purpose of this data gathering method was to enable the first author both to record her thoughts and record connections between previously gathered data.

*Document analysis.* A variety of documents were gathered while in the field and were used to gain additional knowledge and understanding of the respective contexts (Jones et al., 2013) in which Patrick and Dillon worked. These documents are characterised as extant documents, which means that the researcher played no part in their construction (Charmaz, 2014). These included but were not limited to: (a) DigiTech brochures; (b) school vision statements; (c) learning resources; (d) curriculum maps and (e) intervention plans. These documents were collected to provide supplementary information about the teachers' DigiTech use and to aid the understanding of their context.

## Data analysis

Data analysis was ongoing through the data gathering process and was conducted using a constructivist approach to grounded theory. Constructivist grounded theory involves coding techniques that facilitate the analysis of actions and processes that are grounded in the data, whilst also acknowledging the existence of multiple social realities. Using Charmaz's (2014) criteria as a framework for grounded theory, data gathering and analysis were iterative in nature but involved a continuous shift between coded data and new data gathering to examine Patrick and Dillon's practice. Consistent with a grounded theory emphasis on the iterative nature of the process, the codes used in the analysis were constructed from the first author's reading of the data rather than emanating from an earlier coding framework. To focus on actions and processes, initial codes were constructed using gerunds.[2] For example, the code of 'creating routines' was used over 'routines' to reflect the ongoing process utilised by the teachers to bring FL and DigiTech to a familiar procedure or sequence of activity in the classroom (see Figure 1).

| | |
|---|---|
| Creating routines<br>Developing expectations<br>Becoming embedded<br>Removing gimmicks | yeah and it's like, you know, as soon as your routines and your expectations are embedded. Life becomes much easier and then for me it doesn't become a gimmick (Patrick, Interview 3) |

**Figure 1.** Example of coding in the category of establishing consistency and routines.

Both initial and focused coding were used to identify and refine key concepts – a process that was further facilitated by memo writing. This constructivist approach can be characterised as a process of constant comparison, which involved comparing data and developing analytic categories (Glaser and Strauss, 1967). This process allowed the first author to identify similarities and differences, categories, patterns and areas of significance. Themes were then constructed from this

process and refined. Data trustworthiness was strengthened through prolonged and regular engagement between the teachers and the researcher and between the first and second authors. Furthermore, the use of multiple methods of data gathering afforded a more in-depth picture of the teachers' interpretations and increased confidence in the credibility of the findings.

## Findings

### *How was flipped learning used?*

*Establishing consistency and routines.* Both Dillon and Patrick viewed FL as a strategy that needed to be established as routine practice and used consistently. Patrick had developed his own culture of setting, and students completing, a piece of FL homework. This pre-class FL homework would normally consist of students watching a video of lesson extracts created by Patrick, in conjunction with an in-class phase of filling out an FL mat. These activities were followed by questions and peer discussion. Patrick created these mats on the application (app) 'Comic Life' and some examples of completed mats were collected as documents for analysis. The mats contained questions, areas to take notes on the video content, diagrams, and information about where to seek extra support through avenues such as Twitter. Dillon similarly used a variety of online resources and platforms as the mechanism for his delivery of students' pre-class FL activities:

> A classic model of FL, it would be Twitter . . . posting a video [both teacher-created and pre-created], a Google Doc, and then a Google Form. The Google Form is there to assess (a) whether they have done it [the task] and (b) to monitor their level of understanding [in the homework], that deeper understanding idea (Interview 6).

As observed, Dillon's in-class FL phase would consist of going through the Google Form quizzes, followed by students' questions and group discussion.

Patrick felt that for FL to be successful he needed to establish routines and cultures of use:

> I have routines at the start [of the lesson], that's just non-negotiable now. Through time, it just becomes a culture . . . so for me you are creating that culture that everyone will buy into eventually. Some will do it quicker than others, but you persevere with it. I think, for instance, the FL that I do has worked really well to the point now where I very very rarely have a student in my GCSE class that comes to me without their homework . . . (Interview 6).

Building and embedding this routine use of FL into his classroom was important for Patrick. He felt FL began to expand and extend students' learning:

> . . . because they are trained and because they are using it [FL and DigiTech] you can stretch and challenge students a bit more in the lesson. With the FL, I'm not having to come in and teach the basics of identify and describe, you know, you can get further up the Bloom's pyramid.[3] Your lessons can become more higher order [thinking] and again, practically, you can therefore challenge your students more (Interview 5).

Dillon also viewed FL as a strategy that needed to be consistently used in conjunction with DigiTech. Dillon felt that consistency was important so that 'they [students] do see it as a tool to improve their learning, rather than just a gimmick' (Interview 6).

The way Dillon used FL and DigiTech was dependent on the class he was teaching. That said, Dillon and Patrick utilised similar practices to support their students. For example, both – as Dillon explains – used the time in the changing room to teach: '. . . the way FL manifests itself in core[4] [PE] would be to make sure you show them [the students] something that they might do or have done in the changing rooms using the screens' (Interview 5). Dillon went on to discuss how these videos might be used at the start of the lesson: 'watching their performance or they might watch a video about what they're doing in that lesson, so they've got that base knowledge beforehand' (Interview 5). As such, whilst this use of FL in core PE was an adapted use of the pre-class FL phase (i.e. exploring content not at home but in the changing rooms), it still allowed them to create a dynamic learning environment where they could support students' learning.

Both Dillon and Patrick saw FL as much more than a gimmick. They felt it was a valued pedagogical approach to teaching in PE. FL needed to be consistent and progressively built into the culture and routines of practice if it was to be used effectively to enhance students' learning. In many ways, FL was used to scaffold and structure their use of DigiTech, allowing them to make connections between students' use of DigiTech and the content of the lesson. The next section explores, in more detail, some of the teachers' reasons for using FL and taking the time to embed it in their practices and classroom cultures.

## *Why was flipped learning used?*

*Optimise lesson time.* Through his willingness to repeatedly engage in cycles of trial and error, Patrick found that FL allowed him to, in his words, 'maximise [students'] learning and activity time' (Interview 5). During a visit to the school, Patrick was observed using FL in core PE to allow him to set and share a homework task ready for the next lesson. Patrick used the camera or 'Coach's Eye' app to record student performances before using the 'Showbie' app as the platform for students to save and submit work. Patrick found that because students gained the knowledge and understanding of the lesson content and goals through FL, the physical activity could start sooner. The 50 minutes of lesson time could, therefore, be used more 'efficiently' and 'effectively' (Interview 5) because students had already completed 20 minutes of work at home. Patrick explained that 'having and doing the work outside of school as home learning means that we can actually be active' (Interview 6). The pre-class, 'home' learning phase was an important area for both teachers because it allowed them to structure the content of the lesson and increase the efficiency of in-class time (field notes). This 'home' learning was where the students often watched teacher-created videos and developed knowledge and understanding prior to the next lesson. Because students had a chance to develop their initial understanding and knowledge of the content at home, both teachers felt they could use the lesson time more effectively for aspects such as physical activity. As a result, Patrick and Dillon believed that FL allowed them to extend the active parts of their lessons, increase the time students spent learning new things and maximise their engagement time with students.

To optimise lesson time in the class phase of FL, Patrick would keep the use of DigiTech in these rest periods 'short and sharp' (Interview 6) to ensure that the students' activity levels were not hindered. The dichotomy, for both teachers, was balancing increasing calls 'trying to get them [students] reducing screen time' (Patrick, Interview 5) with the wish to enhance and optimise their learning by using a screen. As Patrick explained, 'it has to be used effectively, it has to be snippets . . . [to] maximise their learning time when they are not physically active' (Interview 5).

Similarly, Dillon found that when he used what he described as a 'diluted form of FL' (Interview 5), for example students reviewing a video clip of a skill, he could not only enable student collaboration, but he could better utilise the time the students spent getting changed. This, in turn, maximised the amount of time students could be physically active when they entered the gymnasium:

> If you can utilise that [changing] time as best as you can so that they are learning, or, even if it's just by association they can see stuff, you know, they may get an idea. That technology is adding value to their experience of PE. It's helping their learning journey or pathway in that area (Interview 5).

Alongside the use of videos in the changing rooms, Dillon, like Patrick, also used FL and DigiTech in students' rest periods. This allowed students to start work in the lesson that they would then be completing at home. Gymnastics and trampolining were both lessons in which Dillon and Patrick would use an FL approach as students were not always able to perform at the same time: '. . . that [lesson type] changes and dictates the way you may deliver and teach your lesson. You might start having a performing group, an analysis group and a reviewing group. They'll analyse what's happened and then review their performance' (Dillon, Interview 5). By considering the class and finding ways of making FL and DigiTech work for him, Dillon sought to ensure that students were learning in cognitive and associative learning domains when not engaged in a physical performance. The use of FL in this way allowed both teachers to optimise students' physical activity time through sound pedagogical decisions without compromising the learning opportunities in the lesson.

*Supporting examination PE students.* One area where Patrick and Dillon tended to use FL more than anywhere else was with their teaching of examination PE. Their rationale for using FL with their examination classes was: (a) they felt it supported and supplemented students' learning; (b) it developed their assessment of and feedback about students' work and (c) it allowed for more student-centred practices. For example, Patrick used FL to 'spend more time on higher order questioning and assessment' and get students to 'develop their writing skills and application of it [their knowledge] to examination questions' (Interview 6). In documents collected from Patrick and described by Dillon, there were examples of FL videos where screencasts were taken of examination scripts or students' work. Patrick, for example, used the video to present his assessment of students' work and recorded both written and verbal feedback. Students were, in their own time, able to (re)watch, fast forward, rewind and pause the videos and develop questions and queries ready for the next lesson. In this way, both teachers felt they could ensure that any FL homework 'directly linked to the next lesson, so it's like a journey . . . they [the students] can see the progress they are making so it's not just a one-off' (Patrick, Interview 5). Similarly, as reflected in the first author's field notes, 'the tailored content becomes asynchronous, personalised and self-paced for the learner'.

Patrick found that FL and DigiTech helped support his students' theory work through assessment: 'I was doing little Google forms, like little multi-choice quizzes using Socrative[5] or Kahoot![6] which took them about 10 minutes' (Interview 3). This is an example of how DigiTech served as a catalyst for the next FL opportunity. Patrick felt that not only was he assessing what his students learnt, he was also able to use his assessment of their work to create the next part of the homework. He was, in short, creating a cyclical process of assessment and an FL resource that could be used before the next lesson. Through this approach, Patrick created valuable Dedicated Improvement

and Reflection Time (DIRT) at the start of the lesson, which allowed students to directly respond to his marking and feedback.

With his examination groups, Dillon used the web-based platform 'myPEexam'[7] as a vehicle for FL. Through this platform the students had access to videos of content and explanations, revision guides, and examination paper/questions. Dillon favoured 'myPEexam' because it tailored its content to the students' learning needs: 'I think it actually does a lot of things. It's student-centred, developing personalised agendas . . . it's very visual and its ease of use [for students]' (Interview 3). Alongside his use of 'myPEexam', Dillon created his own videos to explain concepts to students. He felt this type of FL worked particularly well in supporting his examination students. He looked at the course specification and either found a video on that or created a video to fill any gaps in the content. He believed these practices worked effectively because students gained a sense of ownership and could choose when and where to use the video to support their learning:

> I think that technology within education can be a tool to help students' learning, for inspiration, clarity of whatever it might be. If you look at the FL model . . . that video is continually available to a student in *their* own time and when they want to use it instead of it being in a classroom under a closed, fixed circumstance in a lesson (Interview 5, emphasis in original interview).

The first author's field notes recorded conversations where Dillon explained that he would modify the task in pre-class FL activities for students who were struggling by asking them to complete key problems (i.e. identify basic elements of a skill) rather than all the tasks (such as the quiz or notes). That said, this was not a foolproof system and concerns were noted by both Dillon and Patrick that students may not watch the videos at home and may instead rely on the work of others in the lesson itself. For example, Patrick explained that he had learnt to mitigate against this by asking the students to write notes or answer questions based on the video content which were checked in class (field notes).

This approach was not only applied to homework tasks. Both teachers used FL content as a means of guiding students into the next lesson's activities. Dillon, for example, would create different activities or 'stations' (with varying levels of difficulty) to scaffold the lesson content for students. Because of this practice, the students could 'move around and progress through, as and when they feel appropriate' (Interview 3). He professed that this practice allowed him to 'circulate the room a little bit more' and 'concentrate on helping those with more needs' (Interview 3). In this regard, Dillon could check the students' grasp of the content before guiding them to move on.

The combination of FL and DigiTech enabled Dillon and Patrick to support their examination PE students' learning both inside and outside of timetabled lessons. They felt they were able to provide meaningful and purposeful assessment/feedback and extend the formal lesson time.

## Discussion

The rationale Patrick and Dillon gave for their use of FL and DigiTech was that it allowed them to (a) optimise students' lesson time and (b) support their examination PE students. Individually, they believed that FL enabled students to enhance their knowledge outside of school so that they could be more active/effective in class. It is worth critically reflecting here that the success of the FL approach was facilitated by the consistent routines and embedded culture of students completing the FL homework tasks. Without the completion of these tasks, students would not have developed the initial knowledge, comprehension and understanding that subsequently enabled the class to

optimise the lesson time. As mentioned by Andre (2018), whilst students' engagement outside of class is decisive in the success of other pedagogical approaches such as Sport Education, it is difficult to overcome their adversity to 'PE homework'. Indeed, as Kinchin and O'Sullivan (2003) suggest, students can refuse to complete homework and may perceive that homework is unreasonable in PE. In this case, however, the teachers emphasised the importance of establishing routines and tried to be consistent in their use of the FL approach to get around such barriers reported in the literature. In doing so, they overcame the potential 'newness' of FL and structured the content so that students were 'doing PE' in their own time. Indeed, as Hill (2018) emphasised, if the goal of flipping the classroom and providing homework is to free up class time for physical activity, then there may not be a subject more appropriate for FL than PE. The use of homework to indirectly promote the time for physical activity, as demonstrated in these cases, is largely unreported in the literature. As such it is important to further examine the use of homework in FL and PE settings (Hill, 2018).

That is not to say that Patrick and Dillon's FL practices were limited solely to setting homework. They also used videos when the students were changing in an effort to reduce instructional or demonstration time and optimise the lesson time. These efforts run contrary to Villalba et al.'s (2017) suggestion that one of the biggest obstacles to teachers' DigiTech use in PE is the loss of physical activity time in class. Given the increasing pressure on allocated curriculum PE time (some of which is inevitably lost in the changing rooms) and the perceived need for students to be physically active in lessons (Cale et al., 2016), FL can, therefore, be a useful pedagogical tool to study further.

Patrick and Dillon stressed the importance of using FL consistently and embedding it into their practice routines. The use of simple and consistent routines has been shown to be supportive when incorporating DigiTech into other pedagogical practices, such as Cooperative Learning. Bodsworth and Goodyear (2017) found that routines of practice were important when supporting students' understanding of DigiTech. This finding is consistent with research conducted with pre-service teachers in the USA. Jones et al. (2017) found that pre-service teachers indicated that rules and routines of practice needed to be established and reinforced to support their own and students' use of DigiTech. It would, therefore, be pertinent for teachers to maintain their routines and be consistent in their uses of DigiTech when using practices such as FL to ensure students' (and teachers') continued familiarity and comfort. This would allow teachers to increasingly use DigiTech more efficiently and effectively when seeking to address goals such as optimising physical activity time.

Internationally, there has been considerable interest in pedagogical practice in examination PE (Brown and Penney, 2018). Indeed, Green (2005), Thorburn (2007) and Casey and O'Donovan (2015) all suggested that examination teaching now holds a dominant place in both the UK national discourse and the careers of many teachers. Due to the increasing importance of examination PE in many countries, Penney (2013: 1) argues that it is paramount to explore how people and their pedagogies can 'make a difference' to students' experiences in examination PE. Patrick and Dillon showed how FL supported their examination students in their theoretical work. Specifically, FL helped both teachers to provide their students with meaningful feedback, feedback that also fed forward to the next lesson. By diversifying the content and tailoring it to students' needs, both teachers felt that they were able to regularly assess students' ongoing understanding and adapt their teaching to address the students' needs. They believed that they were able to make a difference to students' experiences of examination PE and their delivery of the content.

Given this use of FL for examination PE and its broader use in higher education, it is important to consider that university courses using FL have reported that the approach requires considerable pre-planning. Furthermore, a lack of diversity in content and videos can affect students' motivation levels (Reddan et al., 2016). As a result, it will be crucial going forwards for Dillon and Patrick to continue to allocate time to plan and create their learning materials whilst also differentiating the content and its delivery. These findings further develop researchers' and teachers' understanding of the 'ways of knowing' (Brown and Penney, 2013: 41) with regards to supporting students' examination PE through FL.

The findings of this study show that FL has the potential to help teachers use DigiTech innovatively and appropriately to enhance students' learning. Indeed, both teachers have seemingly made an important step, a step that the literature suggests is difficult to take. As Casey et al. (2017a) argue, there is a need to take a pedagogical approach to DigiTech and ensure that pedagogical approaches are adopted to maximise the latent potential of technologies. This allows for the acceleration of learning in meaningful ways that meet the individual needs of the learner. More recently, Koekoek and van Hilvoorde (2018) argued that it is becoming increasingly urgent that, as a field, we better understand the way teachers select DigiTech without losing the main pedagogical or educational goal of the lesson. It would seem that FL is one of many pedagogical approaches that can be used to scaffold the use of DigiTech and one that can start to address some of the ongoing challenges facing PE in the future.

## Conclusion

Literature suggests that there is some hype around the term FL and its potential for education (Sharples et al., 2014). Therefore, it is useful to consider the practical realities of the approach and how it may be used effectively in pedagogically structuring the use of DigiTech in PE. This paper has demonstrated that if PE teachers can adopt FL in a consistent and routine way, then they may be able to optimise the lesson-time support they can provide for student learning. Rather than repeating or spending valuable time explaining basic concepts, lesson time can be devoted to more engaging, student-centred activities and increased physical activity. This paper has shown some of the practical realities and interpretations of the FL approach and the need for FL and DigiTech to be used consistently in routines of practice. Furthermore, FL can also be used to support examination PE students' learning by supporting feedback, assessment and student-centred learning.

This study was limited in its exploration of FL as it was conducted with a small number of PE teachers. As such, further research is needed to explore both students' and teachers' perceptions of FL in different school contexts and to ascertain whether it has any impact on meaningful learning outcomes that arise in PE's future. In addition, given the age range of the participants, future research could be undertaken with more diverse age groups. Beginning to explore this approach and the use of DigiTech also begins to join up our ambitions to put pedagogy before DigiTech. Consequently, further research should aim to unpick the detail of both the process and outcomes of FL towards students' learning, our teaching and the knowledge in context.

Cushion and Townsend (2018) recently argued that most articles in sport pedagogy simply report the utility of using DigiTech, without examples of context or suggestions for use. We have provided contextual applications of DigiTech and teachers' suggestions for how/why it can be used through FL. FL can be considered as an underpinning structure that allows DigiTech to be scaffolded into the learning context and address gaps in PE teachers' practice. That said, it is important to recognise that there are many challenges for teachers when using DigiTech, many of which may

also occur when combining the use of DigiTech with FL. Any change of practice will be dependent on aspects such as lack of knowledge and resources, or the time investment required (Villalba et al., 2017). Future investigations of teachers' implementation of FL will, therefore, need to consider the needs of the learner, the ways in which FL will be delivered and how, over time, teachers become increasingly knowledgeable of the approach. FL could provide a scaffold and means for teachers to reflect upon and consider their use of DigiTech and desires to redirect attention away from themselves and towards the learner. In this sense, FL is potentially a fruitful and beneficial pedagogical approach to explore as the digitisation of PE continues.

## Acknowledgements

The authors would like to thank the reviewers for their development of the manuscript. Thank you to the physical education teachers and schools who made this research possible.

## Declaration of Conflicting Interests

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

## Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

## Notes

1. Academies are publicly funded independent schools. They receive funding directly from the government, not the local authority.
2. A gerund is a word ending in 'ing' that is made from a verb and used like a noun. For example: resisting or conducting.
3. 'Bloom's pyramid' refers to Bloom et al.'s (1984) taxonomy of educational objectives. The framework consists of six categories: knowledge, comprehension, application, analysis, synthesis and evaluation.
4. The term core PE in a UK context refers to the compulsory hours of PE that students are required to complete as part of the national curriculum.
5. Socrative is an app used to create quizzes and activities for assessment.
6. Kahoot! is a game-based app used to create quizzes and games for assessment.
7. 'myPEexam' is now called 'The EverLearner'. It is a web-based platform containing video tutorials and assessed questions on PE examination content.

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