Primary Pupils' Engagement and the Teachers' Changing Role in Technology-enhanced Physically-active Mathematics

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Primary Pupils' Engagement and the Teachers' Changing Role in Technology-enhanced Physically-active Mathematics

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Abstract

This paper presents the case study of an intervention called Numberfit that aims at capturing primarily students' interest in mathematics by combining team games for mathematics and physical activity. We describe the hybrid learning space that is created through this approach that includes an online platform that allows the teachers and facilitators to design a lesson plan, input student scores and visualise a leaderboard. At the same time, various digital and tangible resources engage students in group (collaborative or competitive) activities while practising a range of topics in mathematics. Following a mixed-methods approach, we examine the changing role of the teacher in this context, and investigate whether there are any differences in students' affective and behavioural states in three different contexts: a. in a normal class setting, b. in an intraschool 'preparation' stage and c. in the league stage of interschool competition. We reflect on our approach with transferable conclusions relating to the methodology for research in hybrid learning spaces and implications for future related work.

Key words: physically active mathematics, affect and motivation, learning design

Practitioner notes

What is already known about this topic:

- Physically active learning (PAL) integrates whole body movement into the existing curriculum in subject areas other than physical education e.g., mathematics.

- Technology allows the creation of innovative Hybrid Learning Spaces (HLS), where teachers and children can interact in a rich variety of face-to-face and remote activities with physical and digital artefacts.
- There is little research looking into motivation and student engagement in teacher-led ecologically valid contexts.

What this paper adds:

- Describes the Numbefit intervention and its digital platform, associated resources and technology that supports PAL in mathematics, and helps create an HLS. Advances our understanding of the differences in behavioural and affective states of primary students in PAL and traditional classroom learning Examines the changing role of the teacher in this context and the role digital technology can play in supporting the adoption of PAL and HLS.

Implications for practice and/or policy

- Evidence for technology-enhanced PAL as a means to engage students in mathematical learning and change the profile of mathematics in schools.
- Teachers' requirements for planning, recording and marking in PAL.
- More research is needed into the potential of PAL including how to research such complex settings.

Introduction

Hybrid learning spaces (HLS) offer the possibility of engaging students in a rich variety of activities, combining elements of two worlds: face-to-face support and contact with peers, and the opportunities afforded by digital technology (Zhang, 2008; Stommel, 2012). In particular, hybrid spaces in primary school classrooms offer opportunities for encouraging interactivity, deeper student engagement and emphasis on student-centered learning (Stommel, 2012; Mcknight et al., 2016).

In this paper, we describe an on-going design-based research project that aims to develop technology to support a physically-active intervention for mathematics and its' associated resources and pedagogy. This intervention combines physical and digital elements. The goal of Numberfit is to improve engagement and attainment in Mathematics and reduce children sedentarism through different types of physically active maths activities where students interact with their peers while practicing Mathematics over a large range of curriculum linked topics (e.g. arithmetic, fractions, etc.).

This digital technology is designed to help the teachers deliver maths sessions, whilst allowing children to interact with learners in other schools. What we present here is an online platform that provides teachers with resources for the physical lessons to prepare the session, and to register what is happening in the classroom during the session.

Numberfit's approach is motivated by practical experience and relevant research around students' attitudes towards mathematics, a topic that often provokes worry, stress and even feelings of powerlessness (PISA, 2015). These feelings are often collectively referred to as maths anxiety (PISA, 2012) and have been associated with poor performance in both primary (Ramirez, Chang, Maloney, Levine, & Beilock, 2016; Punaro & Reeve, 2012) and secondary students (Hill et al., 2016). Encouragingly, research has shed light on the importance of promoting physical activity within the school curriculum not only for physiological benefits, but also psychological improvements (Donnelly et al., 2016). Recently, studies have demonstrated significant interaction between physical activity, cognitive functions and academic attainment (Vazou & Skrade, 2017) as we discuss in more detail in the next section.

Background of this study

Physically active learning

Physically active learning (PAL) integrates whole body movement into the existing curriculum in subject areas other than physical education (Quarmby, 2015). While previous research indicates that teaching mathematics through physical activity (PA) is an effective method compared to traditional methods (Hraste, De Giorgio, Jelaska, Padulo, & Granić, 2018), there is little research focusing on teacher-led *in situ* interventions that have evaluated their impact within the mathematics domain (Daly-Smith, Zwolinsky, & McKenna, 2019; Arroyo et al., 2017). In particular, to the best of our knowledge, there is little research going beyond purely academic performance and looking into motivation and student engagement in this context (Álvarez Bueno et al., 2017).

It is important to look into this in more detail as previous research has found that early primary children's maths anxiety was negatively related to their use of more advanced problem-solving strategies, which in turn resulted in poor maths achievement (Ramirez et al., 2016). Children's motivation towards learning is strongly related to a construct known as self-efficacy i.e. their self-belief and judgment of (rather than actual) capabilities to execute courses of action required to achieve the desired performance (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001). Within the education domain, self-efficacy has been referred to as academic self-efficacy, which is students' belief in their capacity to learn and perform specific academic tasks (Elias & Macdonald, 2007). Bandura (1997) postulated four sources that contribute to the development of self- efficacy. The first source includes mastery experiences, which suggests previous experiences of success in a task can increase self-efficacy beliefs. The second source highlights vicarious learning, which involves observing and learning from social models. The third source is through verbal persuasion. Individuals who receive encouragement that they are capable to master certain activities lead to greater resilience. Finally, physiological and psychological reactions at the time of the task may also serve as a feedback and affect self-beliefs. Encouragingly, the classroom environment has been shown to positively impact maths performance through its mediating effect on self-efficacy (Fast, Lewis, & Bryant, 2010). Therefore, it is possible to hypothesise that a more engaging classroom environment may have an influence in long term academic performance through building self-efficacy from motivating and engaging mathematics experience.

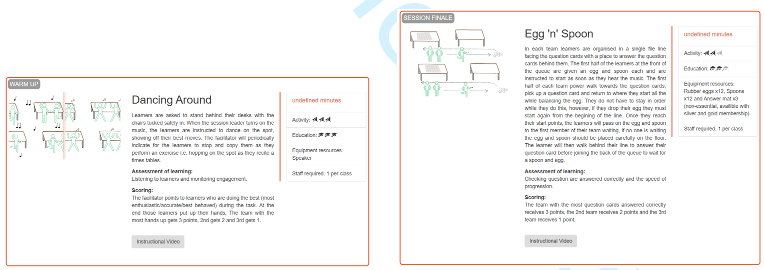
Given the above and before we articulate the research aim of this paper, we present the Numbefit technology-enhanced physically-active learning intervention as it sets the context for this research study.

Digital technology in Numberfit sessions

We present below the current iteration of the platform that support the intervention that has evolved over time following feedback from teachers. We start with an example of a Numberfit session that can help illustrate key features of this intervention.

Example of a Numberfit session

In a standard session, the children are divided into three teams, and they are practicing a particular topic. For our example, let us focus on the topic of "Addition".



(a) (b)

Figure 1: Numberfit game. Copyrighted.

The session consists of 2 activities. The first of them (Figure 1(a)) is a warm up activity, in which the children are interacting within their teams, following challenges that the teacher sets. In the second one (Figure 7(b)), they play a game, in which they need to solve as many questions as possible, which can be found in Question Cards (a physical resource the children interact with).

Numberfit sessions combine physical activity with maths questions to raise engagement through gamified and personalized active mathematics sessions at the same time minimizing sedentary learning time.

Table 1: Hybrid space dimensions of the Numberfit intervention

Hybrid Space dimension		
Resources	Physical *Children interact with physical question cards*	Digital *Teacher inputs scoring on the interactive leaderboard*
Peer interaction	Face to face *Children interact with peers in their classroom*	Remote *Classes interact using the webcam*
Interleaving time	Synchronous *Competition in real time, synchronized through webcam and connected classrooms*	Asynchronous *Competition across several league sessions. Sessions without webcam*
Physical activity	Children moving *Children running on the spot*	Children Not moving *Just standing listening to the teacher*

Hybrid learning space dimensions

These sessions have been enhanced with technology, creating a hybrid learning space in which a big part of the activities happen in the physical space, while some of them are recorded and are included in the digital space. Some of the hybrid aspects are described in Table 1.

Database of activities and user interface for teachers

A range of activities are stored in a database, and classified by physical activity level, resources needed, space needed, number of adults needed, etc. These parameters allow the session to be adapted to the specific class of students and circumstances (see Figure 3). When planning the session, the teacher can specify the number of students, the topic and some aspects related to the hybrid space (see Table 1).

The activities are designed to either teach mathematical concepts, or to practice topics which the teacher has already covered in class, or to be used as games e.g. tossing a bean bag to score points after answering a mathematical question. They are videos explaining each of the activities, as well as some additional digital resources to be displayed over the smartboard. After or during the session, the teacher can write feedback about each of the session plans, which are stored on the platform.

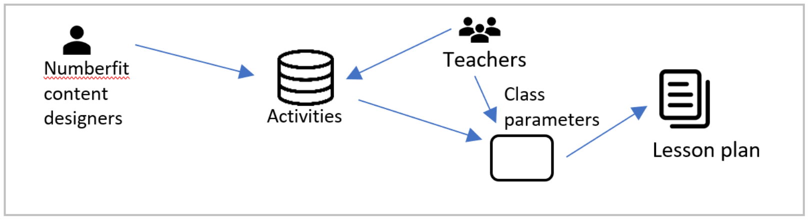


Figure 2: Online system schema. The Numberfit content designers design the different activities and input them in the database, according to some parameters. Then, the teacher chooses the parameteres of a session and get the lesson plan that meets their requirements.

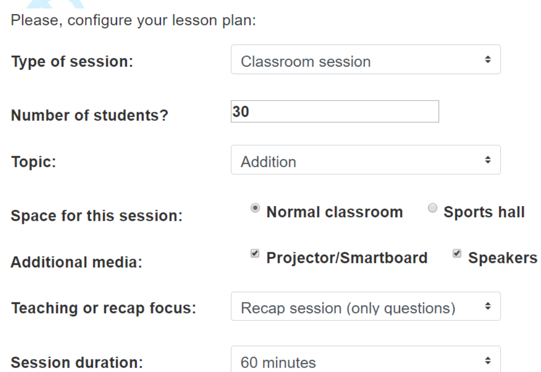


Figure 3: Configuration of session parameters

Recording evidence, scoring the activities and leaderboard

Many of the activities proposed in the platform are games which are played in teams, encouraging collaboration and competition. The games are scored during the session with the help of a patented plastic mat with 'pockets' for the answers. This dramatically reduces marking time because the back of the answers complete an image that when flipped the teacher can quickly recognise visually (this Visual Answer System is patent pending; for details see https://www.numberfit.com).

Other digital technology is used to record the scores of each team on the platform during the session. This can be done either in the web interface to the teacher portal, displayed over the teacher smartboard, or in an app (shown in Figure 4). The recorded scores are displayed on a leaderboard and shown to the students during the session.

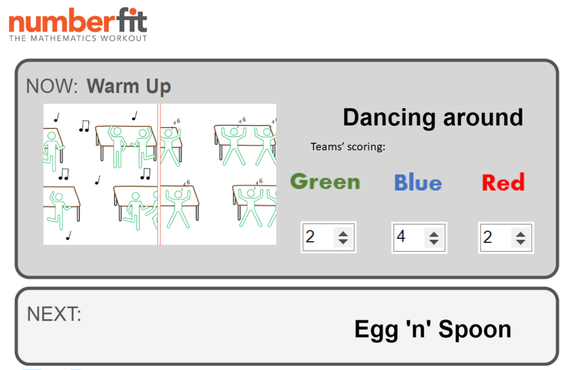


Figure 4: Interface to input scores. This can be done by the teacher either on a tablet or on the interactive smartboard.

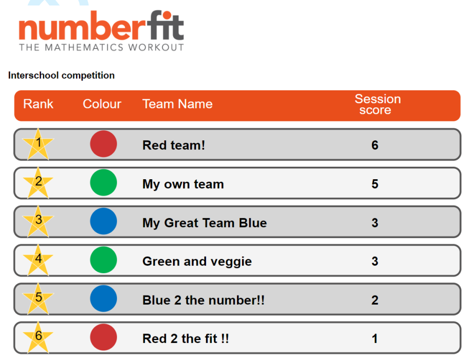
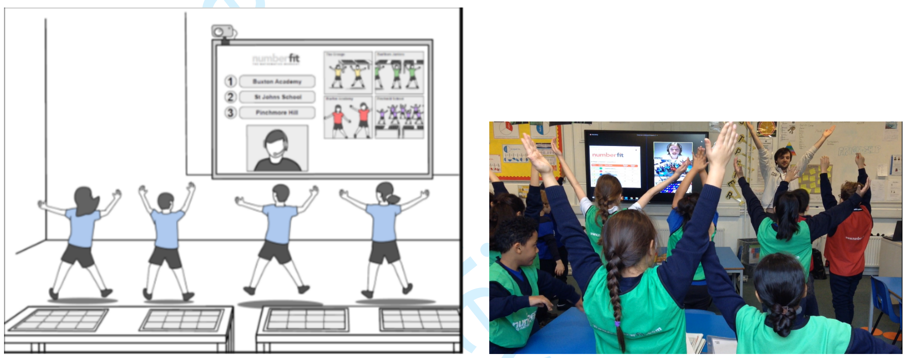


Figure 5: Interactive Whiteboard Leaderboard

Webcam competition

The Numberfit approach includes two types of sessions. The first is a 'classroom Numberfit session' and contains all the elements described above (Figure 7(a)). The second type is a 'webcam competition session', in which teams of pupils from several schools can compete over a webcam. First, the teacher logs into the teacher portal where the session plans can be read. Then, the teacher portal provides a link to access the interschool competition, which should be accessed at a specified time. The session is supported by an online facilitator (a Numberfit employee) who provides instructions, keeps timing, motivates the teams and monitors the online display, e.g. showing the required information when the teams are playing the games. After the pupils finish a game, the teacher inputs their scores, which are directly displayed on a leaderboard.

Figure 6: Children interacting with the interactive screen while answering their physical question cards.



(a) (b)

Figure 7: Webcam competition. Image Copyrighted.

Research questions and rationale

The aim of this study is, on one hand, to advance our understanding of the behavioural and affective states of primary students during physically-active learning and, on the other hand, to research the changing role of the teacher in this context.

Given the innovative nature of the context and the different elements of team work and competition, it was deemed important to go beyond academic achievement, which has been discussed in prior literature, and instead examine whether affective and behavioural states differ between (a) a normal class setting and the two different types of sessions described above (b) intraschool sessions and (c) an interschool competition. As such, a within-subjects comparative study aims to explore the following research questions:

- RQ1: Is there an effect of technology-enhanced physically-active learning sessions on students' engagement in mathematics?

Importantly, investigating the role of the teacher, the challenges and professional training needs that they face in this context has the potential to contribute in the design of the technology to further support them and can lead to a better understanding of how the proposed structured of the Numberfit lesson and the digital resources are helping teachers or not adopt a varied pedagogical style. In addition, our goal is to derive recommendations for classroom implementation of similar interventions. As such the second research question is:

- RQ2: What is the role of technology in physically-active learning and how does the role of the teacher change as a result of its introduction?

Methodology

The study discussed here is part of a larger research program that is taking place across several Year 3 and Year 4 classrooms (8 to 10-year-olds) located in London for a term. Each session lasts between 45 and 60 minutes and there is a different lesson plan every week. Each week students are competing in their own school with their classmates whereas every other week students are competing with same year students of another school through a webcam.

This paper zooms in one Y3 classroom (n=29 with 17 boys and 13 girls). Numberfit facilitators in collaboration with each class' teacher had already divided the students into three equally numbered groups. Teacher selection in this case was not grouping into heterogenous teams. Every student wore a shirt with each students' number on it. This way all students had a specific number throughout the sessions and it was easier to observe them during the Numberfit sessions.

It is challenging to conduct research in this area. Going beyond coarse-grained data from performance tests or self-reports, we recognise the need to triangulate any findings with contextual human-labeled systematic observational data. As such, we are employing an approach based on the BROMP protocol for quantitative field observations of student affect and behavior (Baker, Ocumpaugh, & Andres, n.d.), and a digital observation tool called "Observata" that allows for open and axial coding (with pre-defined codesets) (Eradze, Rodríguez-Triana, & Laanpere, 2017). Observata initiates a lesson observation protocol based on a learning scenario, including in lesson annotation of pre-defined tools, artefacts, actors, learning goals and related activities. The affective and behavioral states of each student and how this evolves over the sessions with and without the webcam (webcam=interschool competition) are being observed. The focus is primarily in the following codes: affective states i.e. boredom, confusion, frustration, delight, and engaged concentration (flow) as well as behavioral states (off task, on task, and misbehaviour). The BROMP protocol recommends 20-second time sampling intervals of both student engagement and affect with the premise that these constructs are somewhat orthogonal (see (Baker et al., n.d.)). A pilot indicated that due to various logistics and other pragmatic reasons, it is more realistic to focus the observation in the middle part of each classroom session of about 10 to 15 minutes. Starting with the Preparation session as a baseline each type of session was observed for about 35 minutes in total over 4 sessions resulting in 103 observations. This was used to constraint the number of of observations for the normal classroom as well.

Moreover, we draw data from four teachers across other classes who were observed during the sessions, as well as during their preparation and debriefing using the platform and the various digital and physical resources. This way, we analyse the intervention from two perspectives: The first one, from the perspective of how the intervention is received by students. The second one, from the perspective of the teachers and how they embrace technology and hybrid pedagogies.

4 Results and discussion

4.1. The student perspective.

The classroom observations during the six sessions of the study illustrated that students generally engage positively in terms of both behaviour and affect. More specifically for our Y3 classroom, out of the 103 behavioural observations during the Preparation stage, students were mostly on task (92 times) whereas only seven were off task and 4 observations were made for students who misbehaved. In relation to the affective states, six observations were boredom, 14 confusion, 12 were delight whereas the rest of them (n=71) were engaged concentrated/flow. At this point, it is important to mention that none of the students were noticed to be frustrated. In other words, the majority of the students, more specifically 68,9%, during the Preparation stage were in a state of engaged concentration. The picture was similar during the League session (see Table below).

		Recap class	Prep	League
Behaviour	On-task	73	92	99
	Off-task	30	7	3
	Misbehaves	0	4	1
	Total	103	103	103
Affect	Boredom	12	6	2
	Confusion	28	14	21
	Frustration	4	0	1
	Delight	9	12	19
	Engaged Concentration	50	71	60
	Total	103	103	103

Table 2: Observation of behaviour and affects in normal recap class, the Numberfit preparation session, and the Numberfit league session.

For simplicity we group the observations into positive and negative and

		Recap class	Prep
Behaviour	on-task	73	92
	off-task or misbehaves	30	11
	McNemar p		.002
Affect	negative	44	20
	positive	59	83
	McNemar p		.001

Table 3: McNemar tests of difference and p-values for the comparison between Y3 teacher-led normal classroom, and Numberfit preparation sessions.

		Prep class	League
Behaviour	on-task	92	100
	off-task or misbehaves	11	3
	McNemar p		.344
Affect	negative	20	24
	positive	83	79
	McNemar p		.618

Table 4: McNemar tests of difference and p-values for the comparison between Y3 Numberfit preparation sessions and a Numberfit League sessions.

use the McNemar Chi-square test as it is the non-parametric version of the usual Chi-square test and applicable to paired nominal data **??**. This reveals a statistically significant difference between the normal class and the Numberfit preparation session. Accordingly, as hypothesised, the preparation sessions of Numberfit seems to have an influence on students' behavioural and affective states (see Table 3).

In contrast, a comparison between the Numbefit Preparation class and the League interschool competition, suggests that there is no differences in behavioural or affective states (see Table 4).

Taken together, these observations are indicating that, as expected, children tend to be more engaged in a Numberfit session than in their typical classroom. Boredom was on average 30% higher during normal class than during Numberfit preparation sessions. There was also a lower percentage of students being on task (70% vs 80% of the overall classroom observation). In addition, although statistically not significant, students appear more collaborative and are displaying fewer moments of negative behaviour (off-task and misbehaviour) when there is competition with children from another school rather than when competing with their classmates. Anecdotally, this seems to be repeated in other classes and further research should check if the findings replicate across classrooms and schools. In addition, we analysed the data for gender and ability group differences and there were none observed. This is positive and indicative that both types of physically-active sessions have the same effect on all groups.

4.2. The teacher perspective

Our interest is now shifting to the role of the teacher in this context and particularly how the teachers get involved or not with the technology and how they use it to prepare and facilitate the Numberfit sessions.

It is clear the preparation of a lesson is an important aspect of this process and of course a necessary step in establishing innovative pedagogy. Without this step, in pilot studies, we have observed the lessons working when the Numberfit facilitators are there but the teacher quickly losing control when the facilitators step back. As such, it became apparent that providing a systematic way to organise the class into the proposed Numberfit configurations was key. Technology, therefore, acts as a scaffold to guide the teacher through this preparation session. While we do not have a large sample of teachers to draw inferences, it seems that that the more experienced teachers appreciate this potential role of the platform and jump into using it, while the newcomers are apprehensive initially, have to be convinced of its value but once supported by the platform's structuring of the lesson can more easily adopt the approach. There are, therefore, important implications of the use of the platform as Continuous Professional Development, which we will consider in future work.

Reflecting on the observations and interviews of the 4 teachers across different classrooms and schools, we can extract some key reflections which can be transferable to how teachers can embrace other hybrid learning spaces.

- *The trade-off between flexibility and off-the-shelf lesson plan.* As discussed, the Numberfit platform allows teaches to configure the lesson plan according to various parameters. This was a result of earlier design requirements that showed the need for flexibility that some teachers expressed. However, due to their high workload, and the need to have a way to embrace this approach without a huge time investment, we found out early in the process that this flexibilty was actually a barrier to adoption. We had, therefore, to find an adequate trade-off between allowing the teacher the possibility to configure the lesson plan, and giving a default lesson plan ready to be used. As such, the current platform encourages configuring a lesson according to some minimum parameters but beyond that it allows teachers to either mix and match activities or follow a default recommended activity. The aspects that teachers found particularly helpful is that they can pick a topic that they are working on anyway and the sessions are themed to the corresponding mathematical concept and connected to physically-active learning. This would be difficult to do otherwise.

- *The challenges of preparation and lesson planning.* Something which also took some time for teachers to fully appreciate was the time it takes to get used to the project 'technology'. With that we mean mean both digital components as the set up for communicating between classrooms, and the non-digital which includes assessment (answer-mats) and games between math exercises (gadgets such as mini beanbags, hula hops, eggs and spoons, etc). Even for the two digitally savvy teachers setting up the webcam, speakers and smartboard, and accessing the videoconference tool in their school's computers and network was rather challenging each time not least because of the number of things that could go wrong every time that these pieces of technology were setup. As we are beginning to identify these issues, the teacher on-boarding process through the platform makes these steps more visible and facilites the setup process.

- *Digitising physically-active learning and team activities.*

  Teachers also reflected on the benefits of having a digital trace of an otherwise difficult setting to track. Starting from the quick setup of each team in the system, they found the group functionality useful, even if sometimes it can be quite rigid. This relates to the point above about configurability and something we can work in the future to improve. Equally important, they found necessary the ability to collect even coarse data from the team work that can be logged. This helps subsequent reporting for the individual students. This need is rooted in current realities, at least in education in England, where the standard of education is interlocked with performance measures (usually test scores). This shapes teachers' professional identities (Pratt, 2016) where assessment has an important role less as a formative means to support teaching and learning, but more as reporting for both student and teacher quality. While technology should not be viewed as a fix to deeply rooted problems, we recognise that the reporting nature of these data appeals to some teachers. In future work, we would like to provide more accurate, granular and student-specific rather than whole-team data that can help on individualised support beyond serving a purpose for the leader-board.

More generally, teachers reported on their perceived and noticeable improvement of the lower groups, the "hard to motivate kids" who were won over by this. While we do not have the data to demonstrate this across schools, the fact that there were no statistically significant differences between groups in the observed Y3 is encouraging. For the teachers, anecdotally, this was a strong indicator of the potential success of such an intervention and the need for such a hybrid learning space to be created with lower achievers in mind. Of course the teachers recognised the effect of novelty, but they were encouraged that the rearranging of the space seems with its new dynamics seems to provide a boost in the right direction.

Conclusions

This paper sheds light into students' engagement in technology-enhanced physically-active learning and the role, challenges and opportunities that a teacher faces introducing such an approach in the classroom. The hybrid learning space experience that Numberfit offers blends the physical and the digital allowing scaling up the specific intervention. In addition, the Numberfit intervention seems to have some positive effect on students' behaviour and affective states, especially compared to traditional classroom. Although this may be something to be expected, it was not necessarily obvious. Nevertheless, taken together with prior literature of effects on achievement (Hraste et al., 2018; Álvarez Bueno et al., 2017; Vazou & Skrade, 2017) discussed in the Background sections, there are important implications considering the long term impact of early motivation in mathematics. Further research should investigate whether these findings are a result of an innovation effect or they are more sustainable.

Methodologically, the use of the BROMP observation protocol through the Observata app allowed us to get a glimpse into the behavioural and affective states of the students and compare the different types of sessions with a normal classroom. HOwever, human labelled observations in classroom are very time consuming, resource intensive and with inherent limitations (c.f. Wragg,2013). The emerging field of mutlimodal learning analytics can provide solutions to this, that is future work can concentrate on analysing such a classroom context through wearables that can keep track of the students' physical activity and new means of recording and analysing affective states.

In further research, it would be interesting to explore how to give further recommendations to the teachers through the online system, depending on the specific constraints in the class (technology available, space required, number of adults in the class); allow more interactivity between the physical and the digital spaces and between the children of different classes; and implement more ways to score the activities.

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Statements on ethics and conflict of interest The research presented here and the overall project research had research ethics approval from the Institute of Education in the context of the dissertation of Rozina Bakirtzoglou and Nicole Yuen who are students at the MA in Education and Technology and MSc in Child Development respectively. The approval process follows BERA guidelines. The anonymised student data is available on request, the teacher data is not available due to the nature of the data analysis and the consent form at the time. The authors have no conflicts of interest to declare in relation to this work. GM, AH and CH are associated with the Social Enterprise Numberfit that has designed and facilitates the intervention but they were not involved in the data analysis per se.

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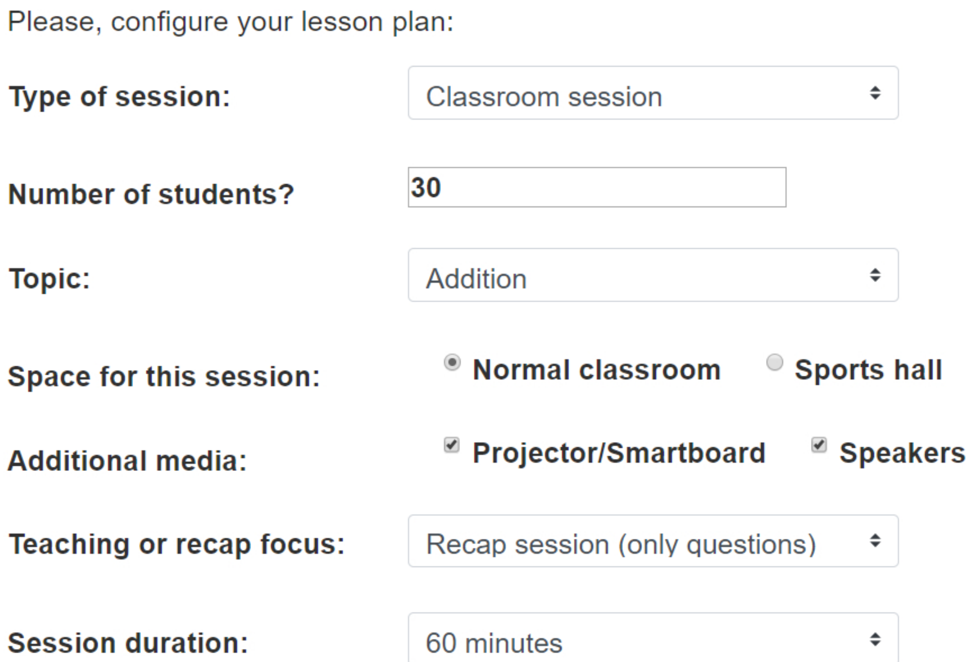
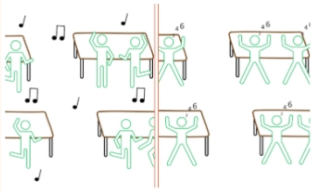

Please, configure your lesson plan:
Type of session:
Classroom session
Number of students?
30
Topic:
Addition
Space for this session:
Normal classroom
Sports hall
Additional media:
Projector/Smartboard
Speakers
Teaching or recap focus:
Recap session (only questions)
Session duration:
60 minutes

WARM UP



Dancing Around

Learners are asked to stand behind their desks with the chairs tucked safely in. When the session leader turns on the music, the learners are instructed to dance on the spot, showing off their best moves. The facilitator will periodically indicate for the learners to stop and copy them as they perform an exercise i.e. hopping on the spot as they recite a times tables.

Assessment of learning:
Listening to learners and monitoring engagement.

Scoring:
The facilitator points to learners who are doing the best (most enthusiastic/accurate/best behaved) during the task. At the end those learners put up their hands, The team with the most hands up gets 3 points, 2nd gets 2 and 3rd gets 1.

Instructional Video

undefined minutes

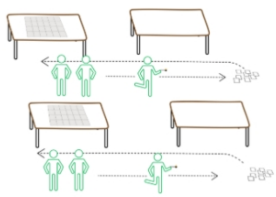
Activity:

Education:

Equipment resources: Speaker

Staff required: 1 per class

SESSION FINALE



Egg 'n' Spoon

In each team learners are organised in a single file line facing the question cards with a place to answer the question cards behind them. The first half of the learners at the front of the queue are given an egg and spoon each and are instructed to start as soon as they hear the music. The first half of each team power walk towards the question cards, pick up a question card and return to where they start all the while balancing the egg. They do not have to stay in order while they do this, however, if they drop their egg they must start again from the begining of the line. Once they reach their start points, the learners will pass on the egg and spoon to the first member of their team waiting, if no one is waiting the egg and spoon should be placed carefully on the floor. The learner will then walk behind their line to answer their question card before joining the back of the queue to wait for a spoon and egg.

Assessment of learning:
Checking question are answered correctly and the speed of progression.

Scoring:
The team with the most question cards answered correctly receives 3 points, the 2nd team receives 2 points and the 3rd team receives 1 point.

Instructional Video

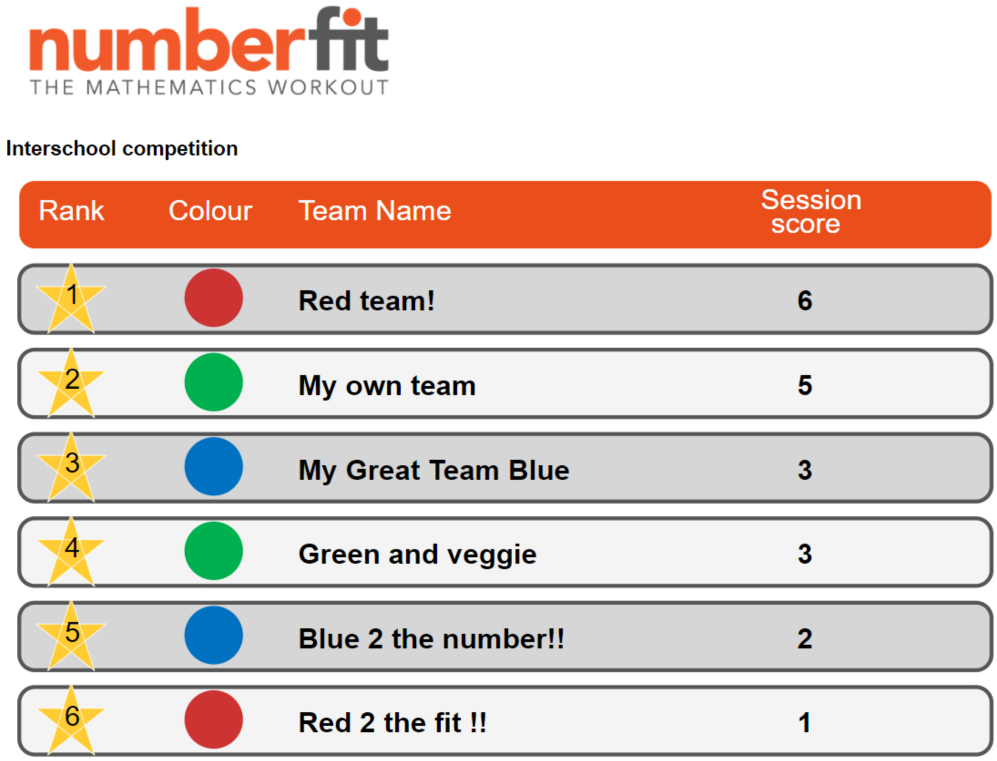
undefined minutes

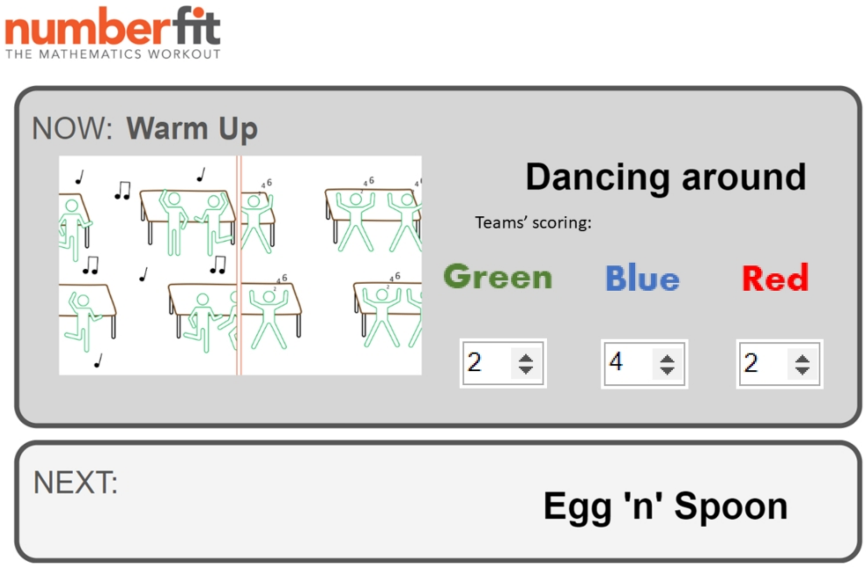
Activity:

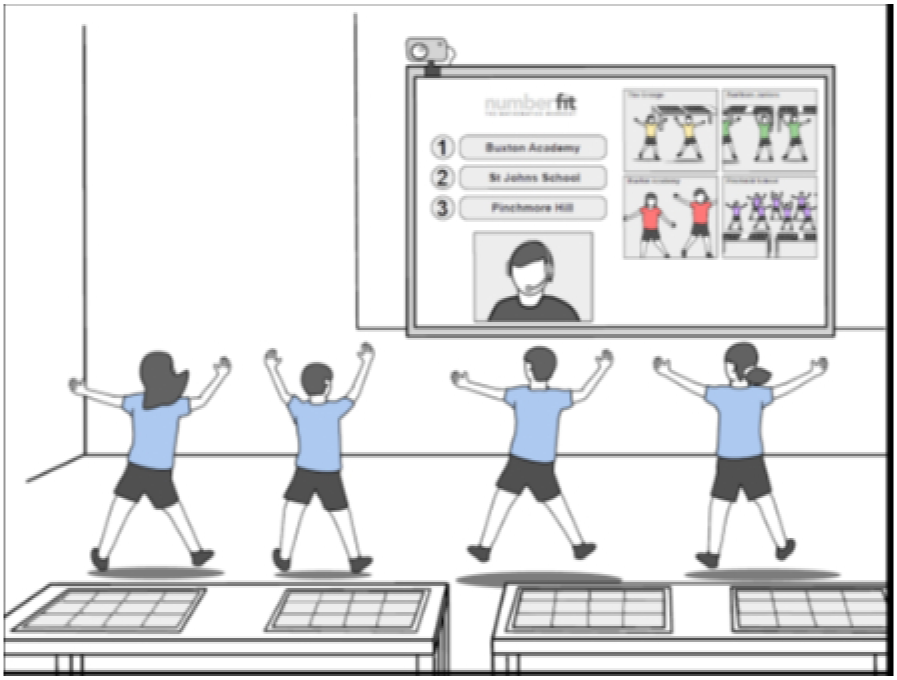
Education:

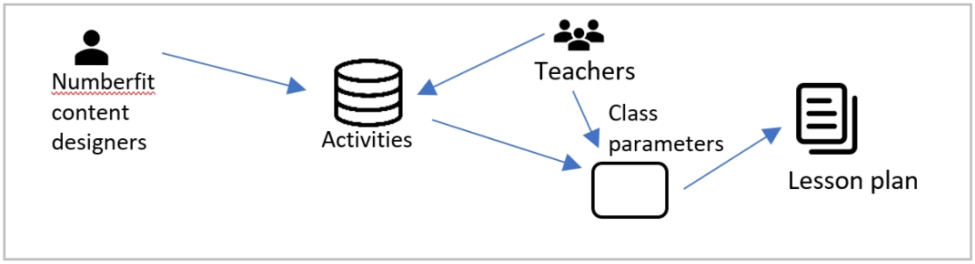
Equipment resources: Rubber eggs x12, Spoons x12 and Answer mat x3 (non-essential, availible with silver and gold membership)

Staff required: 1 per class


numberfit
THE MATHEMATICS WORKOUT
Interschool competition
Rank
Colour
Team Name
Session score
1
Red team!
6
2
My own team
5
3
My Great Team Blue
3
4
Green and veggie
3
5
Blue 2 the number!!
2
6
Red 2 the fit !!
1


numberfit
THE MATHEMATICS WORKOUT
NOW: Warm Up
Dancing around
Teams' scoring:
Green
Blue
Red
2
4
2
NEXT:
Egg 'n' Spoon


numberfit
1
Buxton Academy
2
St Johns School
3
Pinchmore Hill


Numberfit
content
designers
Activities
Teachers
Class
parameters
Lesson plan

481x270mm (72 x 72 DPI)

914x516mm (72 x 72 DPI)