The Use of Gamification as a Vehicle for Pedagogic Sharing and Teachers' Professional Development

El uso de la gamificación como vehículo de intercambio pedagógico para el desarrollo profesional del profesorado

Richard Greaves - *University of Essex Online (United Kingdom)*
Dimitrios Vlachopoulos - *Rotterdam School of Management, Erasmus University (Netherlands)*

ABSTRACT

Gamification introduces game mechanics into organizational contexts to improve impacts, outcomes, or staff engagement in an identified area of focus. This action research explores the potential of gamification as a system for the sharing of pedagogic practice in an international secondary school. The study investigates whether a gamified approach can address the identified drawbacks of more traditional out of workplace, leader driven continuing professional development (CPD) workshops by offering an alternative that spreads pedagogic practice through a school. The study uses a 6-week activity encouraging teachers to create, develop, and share their pedagogical practice through live demonstration with an observing peer for critical feedback. Each part of this process scored points to create the gamified elements. The study gained data through fourteen participants, all teachers at the school with a mixture of experience. Participant perceptions on the impact of the gamified process in its success in fostering the sharing of pedagogic practice, fostering collaboration, and acting as an alternative to traditional CPD were gained through the completion of pre-gamification and post-gamification surveys. The findings show positive support for the use of gamification in a school context for increasing pedagogical sharing, enhancing individual teacher's confidence in their depth and use of different strategies, and that gamification can provide a positive professional development vehicle for schools. It identifies new avenues for further research in the use of gamification for school CPD, and whether gamification should be used to support or replace more traditional CPD practices in schools.

Keywords: continuing professional development; gamification; pedagogic sharing; collaborative learning; teachers' professional development.

RESUMEN

La gamificación introduce mecánicas de juego en contextos organizacionales para mejorar el impacto, los resultados o la participación del personal en un área específica de enfoque. Esta investigación-acción explora el potencial del juego como sistema para compartir la práctica pedagógica en una escuela de educación secundaria internacional. El estudio utiliza una actividad de 6 semanas que invita al profesorado a crear, desarrollar y compartir su práctica pedagógica a través de demostraciones en vivo con un/a compañero/a observador/a para recibir comentarios críticos. El estudio obtuvo datos de catorce participantes, con una mezcla de experiencia profesional, todos/as trabajando en la misma escuela. Las percepciones de los/las participantes sobre el impacto del proceso gamificado, su éxito en fomentar el intercambio de prácticas pedagógicas y su eficiencia como una alternativa al desarrollo profesional "tradicional" se obtuvieron mediante la realización de encuestas previas y posteriores a la gamificación. Los resultados muestran un apoyo positivo al uso de la gamificación en un contexto escolar para aumentar el intercambio pedagógico y mejorar la confianza de los docentes en cuanto a la profundidad y uso de diferentes estrategias pedagógicas. Además, se demostró que la gamificación puede proporcionar un vehículo de desarrollo profesional positivo para las escuelas. Finalmente, el estudio identifica nuevas vías para futuras investigaciones sobre el uso de la gamificación para el desarrollo profesional del profesorado de las escuelas.

Palabras clave: desarrollo profesional del profesorado; gamificación; práctica pedagógica; aprendizaje colaborativo.

INTRODUCTION

Whilst demand for continuing professional development (CPD) in schools is high with a focus on best practice improvements in pedagogy (Dodd, 2017), measures of the effectiveness of CPD in international schools, or agreement on the best process for teachers to enhance their pedagogical toolkits are problematic, with international educators reporting mixed perceptions on the quality of CPD received (Powell & Bodur, 2019). Additionally, workload often serves as an inhibitor to successful reflection and/or additional research (Forrest, 2018) that could further embed new skills and knowledge into classroom practice.

This study aims to explore the adoption of new pedagogic activities, strategies and techniques by implementing gamification where teachers are tasked with experimenting on the use of new activities and strategies in their class and score points either through delivering or designing new activities for other teachers to use, or by observing teachers' experimentation and offering feedback. Vlachopoulos and Makri (2017) and Baiden et al. (2022) highlight the motivational benefits of using gamification through technology to embed practices and achieve outcomes in educational organisations. It is used in the context of this study as a method for assessing the efficiency of individual take up of teaching strategies, techniques or activities that are shared through a process of collaborative, observation and reflection.

This research uses gamification as a vehicle to create an environment that encourages experimentation to aid effective practice adoption, the latter being ideas put forward by Lopez-Carillo et al. (2019) as outcomes of more beneficial professional development approaches in schools. It uses game mechanics in a non-game context to promote pedagogical sharing among teachers. The practice focuses on collaboration between teachers to isolate specific aspects of a lesson. The concept is that teachers score points for each link in this chain that they take part in, such as researching and presenting activities for a lesson, delivering activities, observing a colleague, and having a follow up reflective discussion.

The perceptions of the effectiveness of this gamified process in changing practice are assessed through participant surveys, once before the process starts and once following completion of a trial period of the gamified process. The information from these surveys is then used to observe the impact on teachers' perceptions of the sharing and adoption of pedagogic practices and the effectiveness of a gamified approach to achieving this throughout the school. These are communicated as both positive or negative impacts and assessed on the degree of change perceived by the participants.

This action research was undertaken in a new and growing international school in China. It focused on teachers working in the secondary section with middle school aged students. Teachers' perceptions were collected, focusing on how gamification can enable a greater frequency of conversations sharing ideas on pedagogic practice.

All teachers in the secondary school were given the opportunity to participate and the resulting sample size was 14 participants.

The overarching purpose of this study is to investigate how teachers view the effectiveness of school professional development activities when delivered in a gamified environment with the use of technologies and peer-to-peer feedback. In order to explore this, three research questions have been designed as outlined below.

1. How will teacher perception of the frequency of learning discussions in school be affected by the adoption of a gamified approach?
2. In which ways can gamification be effective in enhancing collaborative sharing to generate an increase in the teachers' perception of their "toolkit" of practice?
3. To what extent can gamification improve more traditional approaches for professional learning in a school?

LITERATURE REVIEW

This study identifies standardised or more traditional approaches to CPD in international schools and assesses research findings on its effectiveness. It also identifies what current research suggests are the most effective approaches for schools to take in developing teachers. The section starts with individual explorations of the literature associated with educational CPD and gamification as they relate to the specifics of this study. To the authors knowledge, there are no studies focusing on the use of gamification as a vehicle for teacher development in China-based international schools. Therefore, this literature review focuses on keywords/terms of "gamification" in studies related to professional development for schools, and also "continuing professional development" as specifically as possible linked to international schools or trends forming part of a discussion that is global or international in dimension. Articles published in peer-reviewed journals, international conferences and research reports have been reviewed in Google Scholar, with an emphasis on studies published during the last 5 years (2017-2022). Some seminal papers were considered useful to show how the topic was studied in earlier years.

Continuous professional development (CPD) in education

Literature recommending a greater emphasis on teacher led initiatives and experimentation over workshops that are part of a whole school, centrally planned CPD strategy have been growing over the last 20 years. Cordingley (2008) observes that studies focusing on student achievement and improving teacher practice identify agentic, teacher led approaches to CPD as more effective than workshops. Cordingley (2015) builds on this by underlying the part played by peer support and long-term collaboration in such models. In addition, further studies show that a subject specific

focus can also hold advantages over CPD with a more generic focus since it allows cross-fertilisation of ideas across subject boundaries (Coe et al., 2020).

Writing in a Teacher Development Trust review, Cordingley (2015) conducted a meta-analysis of studies relating to school CPD strategies to review and identify both more and less effective practices. Considering a range of evidence, organizational environmental factors such as community and a shared interest in purposeful growth emerge as the more effective practices whilst didactic approaches as often associated in more generic workshops are identified as less effective due to the inclusion of activities that lacked potential for engagement or reflection. Kennedy (2016) develops this point by highlighting the juxtaposition which is presented by a didactic approach to teacher CPD that lags behind the focus in present day education of fostering greater metacognition and learning skills through agentic exploration by students.

Teacher agency is highlighted as an enabler in several studies such as Gao et al. (2022), who outline agentic proactivity as allowing teachers to positively develop their practice, whereas agency is cited as providing the capacity for personalisation of CPD by Noonan (2018). This is due to the growing recognition of the individual nature of requirements and the evolving nature of any individual's demand, which combined require PD to be more responsive and agile. However, counter viewpoints such as Comert (2018) question the extent to which the majority of practice in schools enables teachers to follow such active roles in their own development.

A range of sources also investigate the proposition that CPD in schools does not always fit the aspirations held for it. The TALIS report (OECD, 2009) holds data spanning over 20 countries and 200 schools in the most developed countries. It shows that although the vast majority of teachers (89%) taking part in the survey reported having CPD on a consistent basis, the frequency and appropriateness of the professional development was not optimal. There was also a core of teachers who reported that the effectiveness of CPD was diminished by the demands of normal teaching workloads.

Nazaretsky et al. (2022) emphasize the importance of increasing teachers' theoretical and practical knowledge about digital technologies in educational settings through CPD. Zimmer and Matthews (2022) develop this point by emphasizing on coaching as one innovative approach to professional development, addressing teachers concerns over staying current with changing technology.

In another study that highlights the predominance of single workshops with limited impact towards the desired impact of improving teaching practice, Mewald and Mürwald-Scheifinger (2019) put forward a more structured process of peer observation, review and reflection as an example of a more agentic approach to teacher CPD. They cite Takahashi's (2014) lesson study linked concept of the 'knowledgable other' as an underlining of the importance of peers in building authentic agentic teacher development. Mewald and Mürwald-Scheifinger (2019) identify the adoption of a lesson study approach as a counterweight to the difficulties associated with workload interference identified through the TALIS report. This can be achieved through its ability to deliver meaningful development opportunities within, rather

than outside of, the normal teaching day. Such studies show a direction that can also counter potential issues such as those discussed by Tran et al. (2022) on what should constitute the focus of the desired improvement in CPD. Their work, based on teachers in the USA states that CPD focus is often placed on improvement of the teacher, rather than improvement of the teaching itself, a situation reported as difficult to reverse without meaningful CPD run in-situ.

Gamification in relation to professional development and learning

Gamification occurs when game-like elements are introduced to improve the impact, engagement with, or outcomes of activities that occur outside of non-traditional game like or entertainment-based contexts (Schöbel et al., 2021). Two of the key benefits of a gamification approach in educational contexts are the increased motivation for, and engagement in, the element where gamification is being utilised, however, Hamari et al. (2014) noted that students rather than teachers are the focus for research in a large proportion of studies. Manzano-Leon et al. (2021) conducted a literature review to identify the key elements of successful application of gamification in learning and educational settings. This highlighted features such as points systems, progress bars, leaderboards, prizes and rewards as elements that contribute to successful results.

The deployment of gamification in online applications occupies a large proportion of research, particularly studies such as Brauer (2019) that focus on systems that facilitate participants in collecting tokens or badges to chart their development or progress. The proposed gamification for this research study will employ low-tech features, such as motivational and engagement leaderboards which makes findings of these studies relevant. Systems with points-based features have been shown to have positive impacts on engagement and motivation through competition and the perception of skill acquisition (Xu et al., 2021). These are not universal, and competition also has shown to induce demotivational and dissociative responses from those who cannot keep pace with the leaders (Ebadi et al., 2021). These may be influenced by pre-existing relationships and the pre-existing culture of the organization. Roohi et al. (2018) identify a mitigating gamification scenario, where its learning component can be enhanced through manipulation of the collaborative elements to fit the underlying cultural context.

A key hook in the explanation of the positive motivational impact of gamification is proposed by Deterding (2011) as drawing from Csikszentmihalyi and Csikszentmihalyi's (1990) concept of 'flow'. This in turn links back to the core identifications of the need for agency in modern day CPD in that the sense of autonomy and self-driven progress provided to participants in stronger gamification examples produces a greater sense of enjoyment. Reflection is another component that is shown to have had positive results when incorporated into game-based CPD examples (Brauer, 2019). This can also be affected by the dynamics of individual

cohorts and contexts but was found to have strong positive impacts with younger or novice teachers. According to Brauer (2019) reflection is also an enabler of agency in systems linked with choice in development pathways.

Despite the majority of research supporting the positive impacts of gamification, there is no guarantee that gamifying activities or processes will result in positive outcomes (Warsinsky, 2021). Hyrynsalmi et al. (2017) have examined 22 studies where the outcomes have not been so positive. Although these are limited to examples where the application of gamification is inappropriate or exposes participants to moral issues or potentially harmful behaviours, or situations rather than studies where the application of gamification produces systemic or process related failure. They do, however, identify a gap in the research on negative effects of gamification and call for additional research in the area.

One of the significant possible explanations for the positives gained from collaboration in gamification examples is the increased access and interaction that participants have with their peers, as highlighted by Boateng et al. (2022), who also highlighted the positive influence on learning progression gained through systems that include or encourage collaborative feedback. Nah et al. (2014) corroborate this perspective, identifying that a consistent theme in gamification studies is that frequency or consistency of feedback is often linked with positive influences on motivation and learning efficacy. Studies on effective peer observation, feedback and reflection for development of practice (Jones & Gallen, 2015; Levin & Flavian, 2022; Bragg et al., 2021) highlight that, despite the unquestionable value of the peer-to-peer learning, the focus should be on the facilitation of effective professional development, rather than the promotion of peer observation per se, since there are concrete design aspects that can effectively accommodate individual learning preferences and promote participant engagement.

METHODOLOGY

This study is an action research project lasting 8 weeks, where data was collected through surveys completed by teachers of middle school students in an international school in China. The data collection is designed to support the understanding of teachers' perceptions of the effectiveness of gamification in impacting the frequency and effectiveness of learning conversations which facilitate the sharing of pedagogic practice as a potential vehicle to enhance professional development.

The study used a 6-week activity during which teachers were challenged to research, introduce, and enhance teaching and learning activities within their lessons whilst observed by colleagues. There was also a collaborative element, where observing teachers write feedback to their colleagues using tailor-made digital templates. Perceptions were recorded prior to the start of the activity through electronic surveys based on current practice in the school. A second round of surveys took place after the 6-week activity to assess the impact on teacher perceptions.

All teachers in the middle school section of the school were given the option to participate, which limits the sample size to a maximum of 20. Because of this, purposive sampling is used since the selection of participants was not random and chosen due to their alignment with the curriculum and age groups taught in the school. Purposive sampling allowed the selection of a smaller sample size of participants with identified skills or circumstances (Tongco, 2007).

The study attempted to observe the effective method of sharing good pedagogic practice amongst the teaching team within the work environment without external, extra-curricular professional development workshops. The reflective cyclic process is central to the research in that the gamification elements of the lesson study approach to encourage collaborative feedback and sharing.

The Table 1 below shows the timeline of the 8-week project.

Table 1

Timeline for the implementation of the activity in the host school

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Introduction to teachers	Teachers are given their starting challenge card		Bonus week, introduce a newcomer to the activity		Bonus week, subject department focus	Bonus week, invite SLT to take part	Final debrief and prize giving
	1st week of demonstrations and observations	Leaderboard updates	Leaderboard updates	Leaderboard updates	Leaderboard updates	Final week of demonstrations and observations	
Initial survey	Game is in progress	Game is in progress	Game is in progress	Game is in progress	Game is in progress	Game is in progress	Final survey

The surveys in the study were to observe the perception of the teachers with regard to the frequency and value of pedagogic conversations and to observe how their confidence of classroom practice developed as a result of the activity. The majority of the data used for interpretation of teacher perspectives comes in the long response questions, three of which are held in the initial survey and five in the final survey.

An inductive approach was employed within the study (Liu, 2016). Thematic analysis of teacher responses was undertaken to gain understanding of their perceptions of the development of their own skills and knowledge and the wider benefit to the school from pedagogic sharing and exchanges. Each individual response was analysed to identify emergent trends in the feedback provided. Rather than testing a pre-set hypothesis, the objective of the study is to generate new theories on effective vehicles for CPD in schools and whether the use of gamification is appropriate and purposeful in such organisational environments.

The design for this action research study is cross sectional, looking at the perceptions of group participants at the time participating in the 6-week activity. Action research has its roots in the mid twentieth century with Corey (1953) identifying it as an approach where practitioners lead initiatives to improve their

practice through research. Survey responses were used to understand and evaluate the impact of the activity, and the value and frequency of the interactions that have developed pedagogic sharing questions that relate to the three research questions.

This study followed a constructivist, interpretivist approach. Employing constructivism in the context of this study was crucial in allowing teachers to experiment within their own classrooms as well as being able to observe practice in the classrooms of others, particularly in seeing how lesson activities are delivered from other subject group perspectives (van der Walt, 2020).

Participants in the study were volunteers, however all of the information collected from both surveys is stored anonymously. Each participant has signed an informed consent letter confirming the steps undertaken as a participant, their right to privacy and what to do if they would like to withdraw from the process at any point. Following BERA guidelines (BERA, 2018) a briefing was held for all secondary school teachers to run through the purpose of the study, the commitment required from participants and how information from participants is used. Additionally, consent for the study to take place in the school through a permission letter, which contains details of the process of the research and how it will be conducted. The access permission letter was signed on behalf of the school by the Head of school.

RESULTS

In this section, the overall characteristics of the sample are provided first to underline the context of the school environment within which the research was conducted. Responses from the longer open text-based responses are then described with summary outlines of the responses, followed by an appreciation of all of the data discussed against the three individual research questions.

Sample characteristics

The following table presents the characteristics of the participants, as far as their age, gender, and the years of teaching experience are concerned.

Table 2
The characteristics of the participating teachers

Gender	8 women/ 6 men
Age	3 under 30 / 9 between 31-45/ 2 over 45
Years of teaching experience	2 teachers with 0-3 years 4 teachers with 4-6 years 4 teachers with 7-9 years 2 teachers with 10-12 years 2 teacher with more than 12 years

Longer Responses (LR's)

Within the surveys participants were also given the opportunity to give longer text responses to give more qualitative responses to provide more detail on the perceptions they had before and after the activity occurred in the school. These are broken into 3 pre-activity and 5 post-activity questions.

Pre-activity perceptions of the amount of control teachers feel they have over their own pedagogic development

The responses to this question generally showed that teachers felt they already had a lot of control over their own pedagogic development. Only one participant registered a response of "minimal control" with all others giving responses such as "A lot", "fairly good control" and "a lot of freedom". Teacher 14 gave a representative response as:

"Total control! I feel that it is up to me to develop or not. Ideas can be given and great resources can be shared; however, it is up to me to actually implement it or not."

Pre-activity perceptions of how teachers feel pedagogic practice is best shared

There was a strong degree of consensus on the answer to this question with most respondents adding comments relating to sharing through peer-based observation. Teacher 1 gave a representative answer as follows:

"Through trust-based sharing, observations and collaboration. Where it feels like a team effort and in an environment where experimental practice is encouraged."

It is important to mention that two respondents mentioned expert delivered workshops and one saying that a variety of approaches was the best to address everyone's needs.

Pre-activity perceptions about their own 'toolkit' of different activities that they can use in lessons

The "toolkit" refers to the practitioners' perception of the variety and depth of different activities on which they can draw upon within their teaching practice. The answers to this question were mixed. Most respondents (10) reported that they feel that they are fairly comfortable or feel that they have good level of confidence in their range of activities with expressions such as "Well equipped", "Comfortable" or "a good amount" against 3 who felt that they were limited or stick to a small number of activities that they are comfortable with. 6 of the respondents expanded their answer to include preferences, aspirations or intentions to expand their Toolkit.

Post-activity reflections about whether it changed the amount of agency teachers have in their own pedagogic development

Despite the majority of respondents in question 1 saying that they felt they had strong agency already in their pedagogic development, 10 respondents said that they felt their perception had changed in that the activity had increased the amount of agency they feel they have in their own pedagogic development. An example of a representative response was given by Teacher 5 who said "Yes, it made me think more actively about areas of focus I wanted improve upon in my own teaching". The other 4 respondents reported that the game reinforced their original perception of their level of agency being high and within their control.

Post-activity reflections on how motivated teachers felt

The responses to the question of motivation were mixed. 7 participants reported a positive response in terms of motivation, citing reasons associated with being exposed to and trying out new ideas. The next most common reason given was the chance to share with others and have more reasons to visit others classes to observe teaching and learning. Two respondents were motivated by the idea of scoring points and/or having a friendly competitive element to their work environment. There were also 4 participants who reported more mixed responses such as "Between motivating and demotivating" and "mixed". Specifically, 2 responded that it was motivating initially but struggled to find people to collaborate with. A further 2 respondents suggested it was motivating but difficult to sustain in the online working environment that the school was placed in for the 6 weeks of this activity due to Covid controls. Others felt that the activity was initially motivating but that either online learning, collaborating with others or their own enthusiasm didn't last the whole 6 weeks. Finally, one respondent stated that they found the whole activity demotivating but didn't give any reasoning.

Post-activity reflections on the benefits and/or drawbacks of following a gamified approach to pedagogic development compared with more traditional professional development approaches

The majority of respondents (10) focussed on positives, whereas some reported a balance of benefits and drawbacks. The most frequently mentioned benefits were focused on the less obtrusive nature of observation taking place within the challenge. The comments suggest that teachers see observations as formal and judgmental, but the activity broke this down to make them seem low risk and more encouraging. Other noted benefits are a positive impact on student motivation, a collective increase in teacher knowledge of activities (and a shared purpose for teachers to build this),

and an accessible way to deliver CPD as quick and easy to absorb activities. The drawbacks were limited to two. Firstly, that points systems can be demotivating for those who may struggle to participate, and secondly, the additional time taken to plan in activities for the challenge.

Post-activity reflections on how teachers feel about sharing their teaching knowledge with others through demonstrations and observations

This question was answered positively with almost all respondents (13) saying that they feel more confident or comfortable with people coming in to their class to carry out observations and to observe colleague as a critical friend. The main associated comment was related to a desire for more feedback within the process. The activity itself didn't involve a mechanism for quick easy feedback to colleagues after the observation feedback was written and would be a good addition to the considerations for running the game to encourage more collaboration.

Results related to the three research questions

The first research question examined the perception of the frequency of learning discussions and how the activity would impact this. Prior to the commencement of this 6-week activity, the perception of pedagogic sharing in the school was mixed. On the topic of pedagogic discussions, participants were evenly split between a perception that these happen on a monthly or longer-term scale and those where it forms part of their daily or weekly routine. Part of the focus of this study was to stimulate such sharing through interactions such as in class observations and passing on of teaching activities and new ideas. With regard to these activities, responses were clearly more skewed towards longer term interactions. Observations are seen to be carried out monthly or less frequently by 11 of the respondents, and 10 feel that they are observed on a monthly or longer timescale.

Table 3
Perception of the frequency of pedagogy-based interactions in school, prior to the activity

	Daily	Weekly	Monthly	Rarely
How frequently do you feel you have pedagogy-based peer discussions that influence and develop your own practice?	2	5	4	3
How often do you feel you pick up or pass on a new activity from a colleague?	1	4	4	5
How often do you observe colleagues?	3	0	6	5
How often are you observed by colleagues?	1	3	3	7

Responses to the three questions in Figure 1 below show that a large majority of respondents reported an increase in interactions with colleagues. 12 out of 14 participants reported that the activity had a positive influence and increased the frequency of pedagogic conversations in the school. The same figure also reported undertaking more observations as a result of this gamified experience. Since during the activity points were scored, there is also an external quantitative measure of the number of demonstrations/observations carried out. During the activity, the 14 participants registered 46-point scoring demonstrations/observations in total. Since these were at least a 2-person interaction, this means there were a minimum of 92 involvements in pedagogic exchange. This averages out to 1.14 pedagogic interactions per person per week.

Figure 1

Data on perceptions of pedagogic conversations after the activity

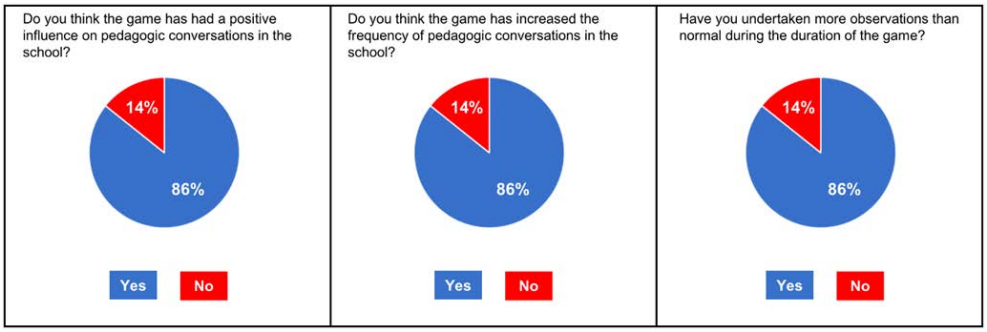


Table 4 shows that the majority of the participants identified positive adoption or experimentation with new activities. In the strongest responses, 13 respondents reported observing a colleague and 13 also reported learning a new practice from a colleague during the course of the activity. The lowest response still showed positive interaction from the majority of responses with 8 out of 14 participants receiving feedback from a colleague. This shows that a large majority (12 out of 14) perceived that such experience allowed them to build capacity in their own range of teaching activities and strategies during the 6 weeks of the activity.

Table 4
Post-activity report

	Yes	No
Learn a new teaching activity or strategy from a colleague.	13	1
Receive feedback from a colleague on your own teaching activities	8	6
Research a new teaching activity or strategy.	10	4
Demonstrate a new teaching practice to a colleague.	9	5
Observe a colleague delivering a teaching activity.	13	1
Give feedback to a colleague on a lesson activity or strategy that you observed.	11	3

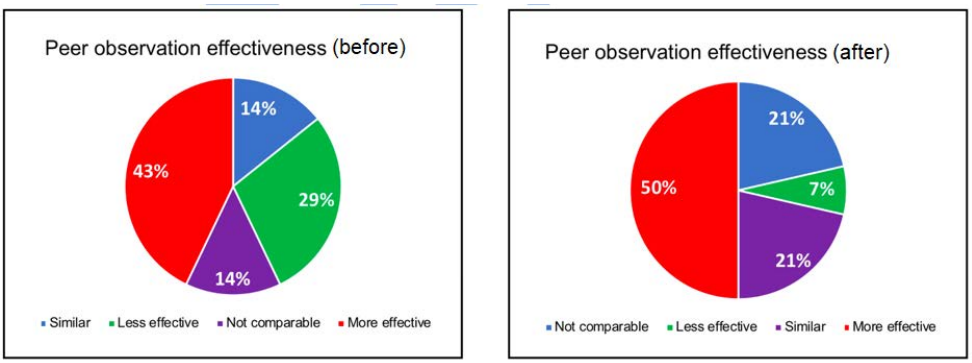
In this line of thought, 12 out of 14 participants felt that this experience provided them with additional teaching practices that they could deploy within their own teaching moving forward. Table 5 shows that expert delivered technology-supported workshops were identified as the most effective method of CPD in schools by the cohort with all 14 respondents rating it as more or most effective. However, in-school collaborative activities were perceived as effective prior to the start of the activity with the majority of respondents regarding peer delivered CPD (10), peer observation (10) and professional learning groups as more or most effective methods of receiving CPD. Online learning opportunities and network groups were rated less effective by the sample group with 5 to 7 out of 14 rating them more effective or higher. However, technology has been considered as an integral part of both online and face-to-face training and all participants reported the importance of developing these digital skills, which can enhance their teaching practice.

Table 5
Perceptions of the effectiveness of different methods of professional development

	Not effective	Less effective	More effective	Most effective	N/A
Synchronous online learning		9	5		
Asynchronous online learning	1	6	6		1
Job alike workshops		4	4	3	3
Networking groups		7	6		1
Education conferences		5	5	3	1
Peer delivered in-school CPD	1	3	8	2	
Peer observations		4	6	4	
Professional Learning groups	1		8	5	
Expert delivered, face to face workshop			5	9	

Participants were also asked to rate their perception on the effectiveness of peer observation when compared with the current default approach of the school of online workshops as a method of professional development. The proportion of recipients rating peer observation as less effective reduced significantly from 4 out of the 14 respondents prior to the activity to just 1 after the activity (Figure 2). Conversely, those rating it more effective increased from 6 to 7. This means that whilst perception of peer observation as being more effective increased by one participant, there was an equivalent increase in the perception that peer observation was similar and also that it was not comparable to online workshops.

Figure 2
Pre-activity vs post-activity perceptions on peer observation effectiveness



DISCUSSION

The first research question seeks to explore a potential solution to the disconnect caused by teachers having to bring ideas learned in workshop based CPD that takes place outside of classrooms and trying to replicate them within their own classrooms. This disconnect is also enhanced within the background of returning to busy workplaces with many competing and often conflicting goals (Kennedy, 2016).

The perception of learning discussions and interactions prior to the gamified activity were considered to have an occurrence of monthly or rarely before this activity. Following the data provided in the post-activity survey, data shows an actual average of at least 1.14 conversations per person per week. This is dependent on considering one demonstration cycle to only have 1 discussion between 2 people. In reality, this is likely to be higher with conversations occurring before and after the initial share and possibly supplementary conversations between additional teachers. Teachers also reported hearing examples of good practice from colleagues who had

observed someone else which would further increase pedagogy-based interactions between colleagues.

An explanation of how this occurred may come from the LR6 responses which suggested the gamified activity broke down the formality of observations as a barrier and therefore enhanced people's willingness to be observed and invite observers into their classrooms. Eshchar-Netz and Vedder-Weiss (2021) identified that most teachers, especially novice ones, have a reluctance in collegial sharing of new learning for fear of negative responses. The incentivisation of observation through the gamified activity could account for the removal of more negative associations with observations. Additionally, respondents reported that the atmosphere served to break down the normal formal assumptions that teachers have of being observed.

Additionally, LR's also showed that teachers felt increased confidence in demonstrating and having teachers in class. Both of these points support the idea that this 6-week activity created a positive environment for learning discussions.

The fact that teachers may also have felt comfortable with peer sharing and happy to determine areas of focus may be due in part to the existing work environment and culture at the school. In addition, participants joined with a majority belief that peer observation is the best vehicle for pedagogic sharing, therefore whilst this 6-week activity was perceived as a strong vehicle for sharing, it could be that other, non-gamified activities may have seen similar results in teacher perception of their own development.

The metrics used to measure interactions among colleagues, all indicate that the majority of participants undertook an activity that required collegial interaction and sharing. The combination of digital elements in face-to-face professional development activity appeared to be motivating and effective approach, since it created opportunities for interaction within the workplace. In addition to demonstrating to and observing colleagues 10 out of 14 respondents reported that they researched a new teaching activity or strategy during the course of the activity. This would underline the perception of 12 respondents that they felt it had enabled them to increase their knowledge of different teaching activities with which they felt confident in using. Whilst the activity lasted only 6 weeks, there are studies that show longer term collaborative CPD giving ongoing increases in teacher confidence, willingness to be observed and helping colleagues overcome issues (McNeill et al., 2016). Also, digital resources (electronic surveys and digital/online templates) would ensure that all the data is visible and not "forgotten" with time.

There may, however, be a finite limit on the relationship between teacher autonomy and development within a self-driven CPD model. Wermke (2013) puts forward evidence that increased autonomy in teachers can ultimately lead to the complexity and risk of teaching being increased to the point where it causes anxiety or other negative impacts.

As mentioned above, caution must be applied in looking at the positive impacts of the data and results and attributing it solely to gamification. In this is example,

gamification in and of itself may not be less important than the focus of the game itself which was collaborative peer observation and sharing. Additionally, studies such as De Vries et al. (2014) and Jones and Gallen (2015) demonstrate that teachers default preference is professional learning that is collaborative and constructs new learning, rather than a more individual learning experience. The responses of the teachers show us that timing is critical if gamification as educational CPD is to be effective. Van den Bergh et al (2015) provide evidence that it is possible to have significant positive outcomes from short term CPD activities in school. For some respondents in this study, repetition of short-term activities over a 6-week period became too long a duration or caused other associated negative impacts that affected motivation for the approach.

Although teachers highlighted that there were some factors that impacted their ability and motivation to take part, one of the reported advantages is that it is a development activity that can take place within the normal working day and week and doesn't need time out of everyday teaching and learning in order to share practice. Evidence in LR4 supports the fact that the activity enabled greater degrees of agency in teachers to drive their own pedagogic development. This is again in contrast to more traditional workshop approaches that often require more centralized planning and cannot happen without specific logistics and administration. This supports the findings of McNeill et al. (2016) who highlight the benefit of an individually selected CPD focus as opposed to that which is driven centrally within a school. However, game design is also an important factor that contributes to or determines successful outcomes. The identification by Van den Berg et al (2015) of interaction and experimentation as the preferred ways in which teachers learn in part helps to explain the success of gamification in this study. The use of digital resources and tools during the activity has increased its efficiency and confirms that the teachers working at international schools, especially after the COVID-19 pandemic, have access to and familiarity with the technology used for collaboration, reflection, feedback and peer-observation.

CONCLUSION

The gamified professional development activity, whilst having potential flaws in motivational aspects appealing to all teachers, did prove to be a stimulus for the uptake of pedagogic sharing with the majority of participants. In addition, it enabled the school to shift perceptions of the frequency of pedagogic conversations from monthly occurrences to at least weekly occurrences for each individual teacher. There is no evidence however that it shifted existing perceptions to create a new or changed outlook amongst participants. The elements of gamification were based on established principles and a strong collegial working environment in the school. The activity didn't create this culture but extended or enhanced the existing culture. Schools without pre-existing collegial working practices may report different

experiences or perceptions. While participants preferred face-to-face training, they all appreciated the fact that the game was enhanced technologically with software and hardware, which helped them develop digital skills that are useful for effective online or blended learning.

Any future study would benefit in an expansion of the qualitative data collection in the form of post-activity interviews to yield a greater level of detail in responses and subsequently understanding. In addition, a study looking at gamification alongside an alternative approach to teacher CPD could isolate the specific impact of gamification in comparison to non-gamified methods. Success of similar initiatives is guaranteed with the provision of evidence-based digital templates and shared criteria for peer-observation and reflection, familiarisation with the digital communication and interaction tools and proper induction to the scope of the activity and the process to be followed.

The research in this study endeavours to find an alternative mechanism for sharing and developing existing good practice amongst teachers and establish this mechanism as a platform for further investigation. The findings suggest that gamification can be a positive and effective method of sharing pedagogic practice within schools and the study produces several different potential areas for further investigation.

REFERENCES

Baiden, P., Essel, H. B., Vlachopoulos, D., Tachie-Menson, A., & Essuman, M. A. (2022). The Effect of Gamification on Home Economics Students' Motivation and Engagement in Drawing Activities. *Technology, Knowledge & Learning, 27*, 161-182. https://doi.org/10.1007/s10758-021-09566-7

BERA [British Educational Research Association] (2018). *Ethical Guidelines for Educational Research*. BERA.

Boateng, A. A., Essel, H. B., Vlachopoulos, D., Johnson, E. E., & Okpattah, V. (2022). Flipping the Classroom in Senior High School Textile Education to Enhance Students' Learning Achievement and Self-Efficacy. *Education Sciences*, *12*(2). https://doi.org/10.3390/educsci12020131

Bragg, L. A., Walsh, C., & Heyeres, M. (2021). Successful design and delivery of online professional development for teachers: A systematic review of the literature. *Computers and Education, 166*. https://doi.org/10.1016/j.compedu.2021.104158

Brauer, S. (2019). *Digital open badge-driven learning: competence-based professional development for vocational teachers*. Lapin yliopisto.

Coe, R., Rauch, C., Kime, S., & Singleton, D. (2020). *Great Teaching Toolkit evidence review*. Cambridge Assessment.

Comert, M. (2018). A quantitative research on the contribution of in-service training to the vocational development of teachers. *Journal of Education and Training Studies, 6*(7), 114-129. https://doi.org/10.11114/jets.v6i7.3239

Cordingley, P. (2008). Research and evidence-informed practice: focusing on practice and practitioners. *Cambridge Journal of Education, 38*(1), 37-52. https://doi.org/10.1080/03057640801889964

Cordingley, P. (2015). The contribution of research to teachers' professional learning and development. *Oxford Review of Education, 41*(2), 234-252. https://doi.org/10.1080/03054985.2015.1020105

Corey, S. (1953). Action Research in Education. *The Journal of Education Research, 47*(5), 375-380. https://www.jstor.org/stable/pdf/27529611.pdf?refreqid=excelsior%3A56db7cf773c4eeacf758e289ed8537ee

Csikszentmihalyi, M., & Csikzentmihaly, M. (1990). *Flow: The psychology of optimal experience*. Harper & Row.

De Vries S., van de Grift W., & Jansen E. (2014). How Teachers' Beliefs about Learning and Teaching Relate to their Continuing Professional Development. *Teachers and Teaching, 20*(3), 338-357. https://doi.org/10.1080/13540602.2013.848521

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (28-30 September 2011). From game design elements to gamefulness: defining gamification [Presentation in conference]. *15th International Academic MindTrek Conference: Envisioning Future Media Environments*. Tampere, Finland. https://doi.org/10.1145/2181037.2181040

Dodd, V. (2017). *What works? The evidence base for teacher CPD delivered by employers*. The Careers & Enterprise Company.

Ebadi, S., Rasouli, R., & Mohamadi, M. (2021). Exploring EFL learners' perspectives on using Kahoot as a gamed-based student response system. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2021.1881798

Eshchar-Netz, L., & Vedder-Weis, D. (2021). Teacher learning in communities of practice: The affordances of co-planning for novice and veteran teachers' learning. *Journal of Research in Science Teaching, 58*(3), 366-391. https://doi.org/10.1002/tea.21663

Forrest, **S.** (2018). Can CPD enhance student-centred teaching and encourage explicit instruction of International Baccalaureate Approaches to Learning skills? A qualitative formative assessment and summative evaluation of an IB school's in-house CPD programme. *Journal of Research in International Education, 17*(3), 262-285. https://doi.org/10.1177/1475240918816401

Gao, J., Xu, Y., Kitto, E., Bradford, H., & Brooks, C. (2022). Promoting Culturally Sensitive Teacher Agency in Chinese Kindergarten Teachers: An Integrated Learning Approach. *Early Years, 22,* 55-70. https://doi.org/10.1080/09575146.2021.1901661

Hamari, J., Koivisto, J., & Sarsa, H. (6-9 January 2014). Does Gamification Work? -- A Literature Review of Empirical Studies on Gamification [Presentation in conference]. *47th Hawaii International Conference on System Sciences*. Hawaii, United States. https://doi.org/10.1109/HICSS.2014.377

Hyrynsalmi, S., Smed, J., & Kimppa, K. (9-10 May 2017). The Dark Side of Gamification: How We Should Stop Worrying and Study also the Negative Impacts of Bringing Game Design Elements to Everywhere [Presentation in conference]. *1st International GamiFIN Conference*. Pori, Finland.

Jones, M. H., & Gallen, A. M. (2015). Peer observation, feedback and reflection from development of practice in synchronous online teaching. *Innovations in Education and Teaching International, 53*(6), 616-626. https://doi.org/10.1080/14703297.2015.1025808

Kennedy, M. M. (2016). How does professional development improve teaching? *Review of Educational Research, 86*(4), 945-980. https://doi.org/10.3102/0034654315626800

Levin, O., & Flavian, H. (2022). Simulation-based learning in the context of peer

learning from the perspective of preservice teachers: a case study. *European Journal of Teacher Education, 45*(3), 373-394. https://doi.org/10.1080/02619768.2020.1827391

Liu, L. (2016). Using Generic Inductive Approach in Qualitative Educational Research: A Case Study Analysis. *Journal of Education and Learning, 5*(2), 129-135. https://doi.org/10.5539/jel.v5n2p129

Lopez-Carillo, D., Calonge García, A., Rodríguez Laguna, T., Ros Magán, G., & Lebrón Moreno, J. A. (2019). Using gamification in a teaching Innovation Project at the University of Alcalá: A new approach to experimental science practices. *The Electronic Journal of e-Learning, 17*(2), 93-106. https://doi.org/10.34190/JEL.17.2.03

Manzano-León, A., Camacho-Lazarraga, P., Guerrero, M. A., Guerrero-Puerta, L., Aguilar-Parra, J. M., Trigueros, R., & Alias, A. (2021). Between Level Up and Game Over: A Systematic Literature Review of Gamification in Education. *Sustainability*, *13*(4). https://doi.org/10.3390/su13042247

McNeill, J., Butt, G., & Armstrong, A. (2016). Developing collaborative approaches to enhance the professional development of primary mathematics teachers. *Education, 3*(13), 426-441. https://doi.org/10.1080/03004279.2014.973896

Mewald, C., & Mürwald-Scheifinger, E. (2019). Lesson study in teacher development: A paradigm shift from a culture of receiving to a culture of acting and reflecting. *European Journal of Education 54*(2), 218-232. https://doi.org/10.1111/ejed.12335

Nah, F., Zeng, V., Telaprolu, A., Ayyappa, P., & Eschenbrenner, B. (22-24 June 2014). Gamification of education: A review of literature [Presentation in conference]. *International conference on HCI in business*. Heraklion, Crete, Greece. https://doi.org/10.1007/978-3-319-07293-7_39

Nazaretsky, T., Ariely, M., Cukurova, M., & Alexandron, G. (2022). Teachers' trust in AI-powered educational technology and a professional development program to improve it. *British Journal of Educational Technology, 00*, 1-18. https://doi.org/10.1111/bjet.13232

Noonan J. (2018). An Affinity for Learning: Teacher Identity and Powerful Professional Development. *Journal of Teacher Education*, *70*(5), 526-537. https://doi.org/10.1177/0022487118788838

OECD (2009). *Creating Effective Teaching and Learning Environments: First Results from TALIS*. OECD. https://doi.org/10.1787/9789264068780-en

Powell, C. G., & Bodur, Y. (2019). Teachers' perceptions of an online professional development experience: Implications for design and implementation framework. *Teaching and Teacher Education, 77*, 19-20. https://doi.org/10.1016/j.tate.2018.09.004

Roohi, S., Takatalo, J., Guckelsberger, C., & Hämäläinen, P. (21-27 April 2018). Review of Intrinsic Motivation in Simulation-based Game Testing [Presentation in conference]. *Conference on Human Factors in Computing Systems*. Montréal, Canada. https://doi.org/10.1145/3173574.3173921

Schöbel, S., Schmidt-Kraepelin, M., Janson, A., & Sunyaev, A. (2021). Adaptive and Personalized Gamification Designs: Call for Action and Future Research. *AIS Transactions on Human-Computer Interaction, 13*(4), 479-494. https://doi.org/10.17705/1thci.00158

Takahashi, A. (2014). The role of the knowledgeable other in lesson study. *Mathematics Teacher Education and Development, 16*(1), 4-21. https://files.eric.ed.gov/fulltext/EJ1046714.pdf

Tongco, M. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany*

Research & Applications, 5, 147-158. https://doi.org/10.17348/era.5.0.147-158

Tran, H. N., Nguyen, C. D., Nguyen, G. V., Ho, T. N., Thi Bui, Q. T., & Hoang, N. H. (2022). Workplace conditions created by principals for their teachers' professional development in Vietnam. *International Journal of Leadership in Education, 25*, 238-257. https://doi.org/10.1080/13603124.2019.1708472

Van den Bergh, L., Ros, A., & Beijaard, D. (2015). Teacher learning in the context of a continuing professional development programme: A case study. *Teaching and Teacher Education 47,* 142-150. https://doi.org/10.1016/j.tate.2015.01.002

Van der Walt, J. L. (2020). Interpretivism-Constructivism as a research method in the humanities and social sciences. *International Journal of Philosophy and Theology, 8*(1), 59-68. https://doi.org/10.15640/ijpt.v8n1a5

Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, *14*. https://doi.org/10.1186/s41239-017-0062-1

Warsinsky, S., Schmidt-Kraepelin, M., Thiebes, S., & Sunyaev, A. (5-8 January 2021). Are Gamification Projects Different?' An Exploratory Study on Software Project Risks for Gamified Health Behavior Change Support Systems [Presentation in conference]. *54th Hawaii International Conference on System Sciences*. Maui, Hawaii, United States. https://doi.org/10.24251/HICSS.2021.159

Wermke, W. (2013). *Development and Autonomy Conceptualising teachers' continuing professional development in different national contexts*. University of Stockholm.

Xu, J., Lio, A., Dhaliwal, H., Andrei, S., Balakrishnan, S., Nagani, U., & Samadder, S. (2021). Psychological interventions of virtual gamification within academic intrinsic motivation: A systematic review. *Journal of Afective Disorders, 293,* 444-465. https://doi.org/10.1016/j.jad.2021.06.070

Zimmer, W. K., & Mathews, S. D. (2022). A virtual coaching model of professional development to increase teachers' digital learning competencies. *Teaching and Teacher Education, 109*. https://doi.org/10.1016/j.tate.2021.103544

Fecha de recepción del artículo: 30/05/2022
Fecha de aceptación del artículo: 21/09/2022
Fecha de aprobación para maquetación: 19/10/2022