Can gamification or Game Based Learning via BYOD increase active engagement in learning activities for student's age 8 - 11 years?

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A research project submitted for the Master of Arts in Learning and Teaching Programme

Department of Education

University of Roehampton London

2018

DECLARATION FORM

I hereby confirm that the work I have submitted for assessment is entirely my own. I certify that the origin and provenance of all the materials in this submission that is not my own work has been identified and acknowledged. No materials are included for which academic credit has been previously conferred upon me.

Signed:  **Date: August 2018**

Abstract

The study of educational technology and its modes of integration into classroom practice is a wide field, full of possibilities. This work focused on the use of a Gamified Virtual Learning Environment (Classcraft) as both a motivational tool and vehicle for interactions with teaching and learning activities via students' personal devices (BYOD). This quantitative Action-Research study was conducted in a British Curriculum private International School in Dubai (UAE) during part of the academic year 2017/18 and used convenience sampling of 44 students and 15 class teachers from year groups 4,5 and 6. It was conducted in response to the identified problem of an implemented Bring Your Own Device Policy, where the devices were not being used for a variety of reasons linked to students' responsibility and general misunderstanding in how they could be used or potential benefits that could be easily realised. Through the study of intrinsic and extrinsic motivation, cognitive and behavioural engagement and cognitive learning strategies and self-regulation, it was found that the implementation of carefully tailored learning activities delivered via a gamified Virtual Learning Environment (Classcraft) as part of a timetabled lessons, student engagement could be increased. Additionally, voluntary tasks that utilised motivational gamified mechanics, such as multimedia assessment tools, customisable avatars, digital rewards, leader boards and sanctions it was found that that 21st Century learning skills, technical competencies, independence and personal accountability for devices and their readiness could also be improved. To capitalise on the benefits of gamification however, it is recommended that practitioners be willing to also go beyond their own training and areas of interest to seek methods and opportunities in which to make the required learning activities, enriched engaging, rewarding and relevant to the students that are expected to undertake them. Suggested recommendations for any follow-up research are that it be conducted throughout the academic year and directly involve more than one teacher across multiple curriculum subjects. It is also recommended that data collection be more seamlessly embedded, non-voluntary and focus on the changes in attitudes, behaviour and achievements of students specifically identified to exhibit low levels of engagement prior to gamification.

Contents

Acknowledgments

During this work I have been fortunate enough to receive help, support and inspiration from many sources, it is impossible for me to list them all but in no particular order:

The staff, students and parents at Kings` School Al Barsha, Dubai. Without whom this research would not have been possible.

The University of Roehampton London and Laureate online for providing the course and vehicle of study.

Dr Charmaine Bissessar, my research supervisor, whose tireless efforts in reviewing and helping me to refine this work were instrumental to its final form.

My wife Javene, even though throughout the duration of this course we moved home twice, started new jobs, she completed her own Masters` in Psychology and grew our first born, she has been a continual source of strength and inspiration.

“Personally, I am always ready to learn, although I do not always like being taught”

Winston Churchill

Chapter 1: Introduction, Content, and Research Objectives

1.0 Introduction

Having a modern Internet enabled device in a classroom is a very powerful tool for teaching and learning (Cristol et al., 2013). In fact, many schools employ a model whereby students bring in their own device from home if it meets certain parameters, (in the case of this study that was an iPad with WiFi and capable of running iOS 9.3 or greater) and use it as a tool for learning in school. However, if teachers do not use sound pedagogy and consistent techniques for implementation, students are likely to not engage fully with the content or if devices are not present and fully ready for use in the planned activity, any attempt to use such devices can be disruptive and frustrating. This can lead to a net loss of the possibility of more enriching and engaging lessons and experiences (Yarbro et al., 2016) due to inconsistencies in the availability or readiness of educational technology.

Thus, a clear strategy, vehicle of delivery and student motivational tool is required in order to encourage students to be ready and willing to engage with learning activities that utilise their devices. It has been proven that gamification elements can increase motivation and the overall learning of students (Harrold, 2015:160). It has been previously established that the integration of technology can enhance learning (Okijie et al., 2006) and that online learning platforms, digital resources and internet connectivity support both teacher and student development (Becker et al., 2016).

In this first chapter, the contextual background of this study, including educational environment and geographic location will be discussed. The problem will be identified and established in relation to the topic and the purpose and significance of the study shall be conceptualised in order to help identify any gaps in current literature. This section will conclude with a definition of terms.

1.1 Background of the Study

First identified as a concept in 2008, (Orosco, 2014) the inclusion of elements usually found within games, or Gamification, into teaching and learning activities is not a recent phenomenon and is beginning to be readily accepted as a positive tool to use in education, with or without technology (Simões et al, 2012). However, as its use becomes more widely used and accepted within education, there is an agreed requirement for more research (Orosco, 2014), specifically towards any possible quantifiable gains, as there is little focus on standalone software and its

effects on linked behaviours or using gamification platforms as motivators for the use of other systems (Darejeh & Salim,2016).

Game design elements, when applied to learning design can enhance and enrich the experience for students and thus encourage greater engagement with the content offered (Sailer et al., 2017). It is proposed that this is done by meeting the three aspects embedded in the theory of self-determination: the need for competence; the need for autonomy; and the need for social relatedness (Sailer et al., 2017). Additionally, the use of digital praise and rewards have been shown, by Bear et al. (2017) to have a beneficial impact on extrinsic motivation.

By embedding a gamified learning platform within a Virtual Learning Environment (VLE), a primary driver of intrinsic motivation is also incorporated (Moldovan, 2014). Therefore, students are afforded the ability to interact with a series of resources, scaffold or challenge tasks, in their own time. This encourages students to increase their engagement when such positive and independent learning behaviours are seen to be rewarded (Simões et al., 2012).

This increase in engagement capitalises on the potential of BYOD as a learning tool and the benefits of Virtual Learning Environments as an organisational and distribution tool has already been seen at the tertiary education level (Looyestyn et al., 2017). However, more research in its evolving applications with younger children is still needed (Halvorsen, 2013). Furthermore, the measurement of students' engagement can provide valuable evidence for the quality of a learning activity, course or instructional tool and help to further refine a model of integration of BYOD and Gamification (Henrie et al., 2015).

1.1.1 Setting

This study was carried out in a UK Curriculum private International school in the United Arab Emirates that uses iPads in years four, five and six as its BYOD solution. Opened in September 2014, it is part of a network of three schools within Dubai and is managed and run by the Kings` Education Group and accepts students from Foundation through to Sixth form that meet the entry requirements (Kings Schools Group Dubai, 2018). As a modern and competitive school, it has access to many teaching facilities and resources but must work within the framework dictated by the Knowledge and Human Development Authority (KHDA), the governing body for Education within Dubai who are responsible for the quality and direction of growth of private education in Dubai focussing on high quality education, happiness and wellbeing (Khda.gov.ae, 2018).

All Students have a full timetable of traditional subjects as directed by the UK government for the National Curriculum (GOV.UK, 2018) as well as language lessons for Arabic and Islamic studies (for Islamic students). At the time of this study, there were 1,367 students on role and 131 teachers, with the largest majority of both being of British origin. Students were required to bring their own devices (an iPad) from year 4 to 6 and secondary students were required to bring a laptop. Each teacher has access to both a laptop and an iPad where required and each classroom has an interactive board, projector, speakers and Apple TV for wireless streaming.

1.2 Problem Statement

Existing research indicates that the use of technology in education can assist with student learning, however, its implementation and use is affected by many barriers. In fact, over 120 individual elements that need to be considered have been identified in the past (Hew & Brush, 2006) which can be broken down into six main categories under the following headings: resources; institution; subject culture; attitudes/beliefs; knowledge/skills; and assessment.

Elements related to resources make up the largest section containing 40% of the barriers and it is in that area that the focus of this study lies. BYOD as a strategy for making technology more readily available to students and overcoming many of the resource related barriers is an option, and many schools choose BYOD over issuing their own devices to students due to financial reasons (Ackerman et al., 2012). The organisation in which this study took place has such a policy that parents and students must agree to and can be found in Appendix B.

However, it has been found that the BYOD approach itself is fraught with many of its own issues relating to capabilities or inconsistencies that are neither minor nor uncomplicated (Delgado et al., 2015). Upon investigation, there appears to be very little empirical research on the impact of a significant barrier relating to insufficient resources at this time, that of a device not even being present or ready to work with (Hew & Brush, 2006). Neither could any research be found using Google Scholar or EBSCO, that directly relates motivational strategies that may be employed to improve the likelihood that a Primary School student device (BYOD) is present and ready to begin work as intended.

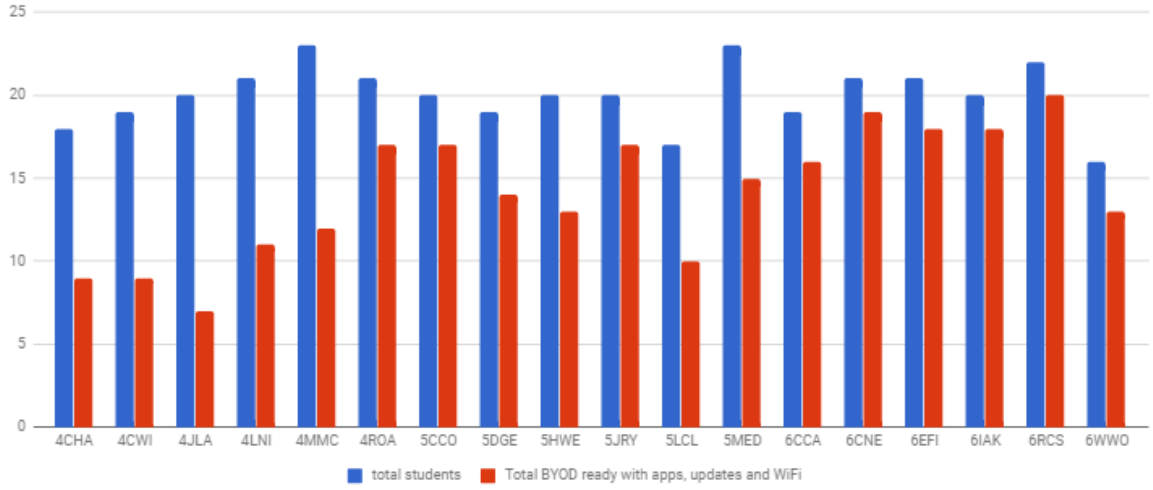
In conversations with teachers, it was indicated that, ‘Children are not looking after their device’ or ‘Children are not being prepared with charged iPads and updated apps’ regardless of a school’s policy about devices being brought to school and ready for use. Interestingly, it has

been proven that a student's perceptions and attitudes towards BYOD are influenced more by his/her peers than by policy, teachers or parents (Hopkins et al., 2013). If this can be leveraged and motivational initiatives are utilised, such like those found in gamified learning platforms, students that are ready to learn with their devices and display positive attitudes to BYOD responsibility, accountability and independence (as per a school's BYOD policy) can be rewarded and thus encourage similar behaviours among other students.

In the context of an International School Primary Computing teacher & Digital Coach, it was found that over the course of a two-week period prior to initiating this study, there was no single class fully ready to begin a lesson that was planned to use BYOD and one particular case, saw less than 50% of students ready to begin the planned lesson with their device (see Figure 1). This observation was carried out during the timetabled computing slot for each year class across years 4, 5 and 6 who are all required to bring iPads to school with the expectation that they are ready to be used as directed by the teacher.

The individual lessons are all at specific, regular times each week and further analysis showed no clear correlation between time of day, year group or class.

Figure 1: BYOD Readiness.



As the school uses Google Suite for education as the productivity solution, iPads are used for accessing resources from the Virtual Learning Environment (Google Classroom), collaboration, documentation and submission of work. Thus, such low percentages of students ready with their devices seriously jeopardises the continuity of the curriculum and can hamper a student's academic development (Hopkins et al, 2013).

Not only does this impact upon BYOD based lessons, but any transition to a more paper free environment via the use of Virtual Learning Environments would also be hampered if a number of students do not have the technolgy to acceess lesson resources or submit tasks digitally. Clearly, this is a big problem and counterproductive to both planned teaching and learning activities and a fully functioning and effective 21st Century Learning Environment.

1.3 Purpose of the Study

The purpose of this study was to investigate the impact digital gamification and VLEs can have on BYOD usage, students' engagement and motivation.

1.4 Research Objectives and Research Questions

The following research objectives guided this study:

1. Discuss the ways in which BOYD can increase engagement in learning activities for students of mixed ability and backgrounds age 8 - 11 years;
2. Identify ways in which BYOD can improve the instructional delivery of lesson content for 8-11 year olds across the curriculum; and
3. Propose recommendations to integrate instructional material via the use of a VLEs?

The following research questions guided this study:

> How can gamification via BYOD increase engagement in learning activities for students of mixed ability and backgrounds age 8 - 11 years?

This question was divided into the following:

1. How can using BYOD improve the instructional delivery of lesson content for 8-11 year olds across the curriculum?
2. What impact does an increase in motivation by using gamified content have on students' engagement with learning activities?
3. What recommendations can be made to integrate instructional material via the use of a VLEs?

With the hypotheses being:

$H1_0$*:* There are a no significant differences between the pre and post-test scores for motivation (self-efficacy and intrinsic value) and gamification via technology.

$H2_0$: There are no significant differences between the pre and post-test scores for learning strategies (cognitive and self-regulation) and gamification via technology.

$H3_0$*:* There are no significant differences between the pre and post-test scores for engagement (behavioural, emotional and cognitive) and gamification via technology.

1.5 Significance of the Study

It is intended, therefore, that this study can contribute to such continued research and facilitate effects as predicted by Greaves et al. in Project RED (2012:1). They discussed how correctly implemented educational technology can have a drastic effect on students' achievement and be revenue positive at many levels, an important consideration in both government-run and for-profit schools. Hopkins et al. (2013) have also identified a need for practical insights into BYOD and how to increase behavioural controls and learning autonomy to improve students' use of such powerful devices and capitalise on the potential benefits.

The nature of student engagement and its facilitators also needs more refinement and greater theoretical understanding as to how it relates to positive and effective technology use in teaching and learning (Henrie et al., 2015), as well as how gamification in general can increase engagement with online programs of study (Looyestyn et al., 2017) such as language or mathematical learning delivered via VLE. Additionally, as highlighted by Schunk (2005) increased motivation leads to increased engagement resulting in better self-regulated learners, an argument can be made for this in application to 21st Century learning skills as regards technological independence and collaborative skills (Clark & Luckin, 2013). Finally, as such need was indicated by Carver (2016), this research could be used to better prepare teachers for the integration of technology in K-12 schools via its informed use in professional development or teacher training. Understanding and more effectively employing the motivational aspects found as a result of this study could allow educators to better design gamified learning platforms and utilise BYOD to enrich learning activities, thus, encouraging increased engagement and increased potential for learning, independence and retention.

1.6 Definition of Terms

BYOD (Bring Your Own Device) - A student-owned and maintained device that can access the internet and run most contemporary digital learning platforms, including Web 2.0 applications for learning purposes (Chou et al., 2017).

Extrinsic Motivation – External factors that influence tasks or learning being completed as a means to an end, rather than for the learning itself (Rienties et al., 2009).

Gamification - The non-game context uses of elements usually found in games. Specifically, to improve student engagement, motivation and increase the learning potential of an activity or experience (Faiella & Ricciardi, 2015).

Intrinsic Motivation - Internally driven enthusiasm to learn that is derived only from the satisfaction and pleasure of the activity or learning itself (Rienties et al., 2009).

Student Engagement - Willing and meaningful participation, curiosity, interest, and investment of effort given by a student to a learning activity associated with psychological investment and effort (Manwaring et al., 2017).

VLE – (Virtual Learning Environment) - A cloud based, always accessible digital leaning platform that acts as a virtual classroom allowing teachers to distribute resources and collect assignments without the transfer of paper. Such platforms often allow for extended discussion and feedback between peers and grading of work. It must be a design information space , co-constructed by students and integrate both heterogeneous technologies and multiple pedagogical approaches, (Dillenbourg et al., 2002).

Chapter 2: Critical Literature Review

2.0 Introduction

The theories used in this study will be discussed below. The following three areas will be discussed: motivation and self-regulated learning (Pintrich & de Groot, 1990); self-regulation of cognition as a learning strategy (Corno & Mandinach, 1983); and student engagement (Mosher & MacGowan, 1985).

2.1 Motivation (Self-efficacy and Intrinsic value) and Gamification via Technology

Pintrich & de Groot (1990) state that student motivation can be conceptualized via three components. Firstly, expectancy, (self-efficacy) which relates to a student's ability to perform a task. Secondly, the value or importance upon which a student places a task, (intrinsic value) which is related to a student's goals and beliefs. Thirdly, an affective component covering a student's emotional reactions to a task, (here included in the emotional aspect of engagement as theory).

Intrinsic motivation is further elaborated upon by Ryan & Deci (2000:56) as the 'doing of an activity for its inherent satisfactions rather than for some separable consequence'. By utilising the open exploration of pedagogically sound knowledge-based content or activities offered to students via BYOD and online platforms, an educator can leverage the curiosity aspect to increase motivation (Clark & Luckin, 2013). This, among other benefits were reported by Clark & Luckin (2013) with special mention of the touch-based interactions and seamless collaborative opportunities iPads offer.

Therefore, in the context of this study, self-efficacy is largely related to how a student uses and maintains his/her iPad, various accounts and logon details, accesses the learning material via online platforms and successfully completes and submit tasks (Clark & Luckin, 2013). The iPad is widely recognised as a powerful educational tool due to its portability, social interactivity, data exchange capabilities, customisation, context sensitivity and connectivity (Chan et al. 2006). However, it must be utilised and maintained correctly in order to be effective. Several of these problems together with other concerns are discussed by Perry & Steck (2015) but where they focus on technical problems and pedagogy, one can look beyond this to enable and encourage the individual student to take charge of the effectiveness of his/her own device via the motivational use of gamification aspects (Mekler et al. 2015). Mekler et al. (2015) found that

more independent individuals favoured intrinsically motivational approaches. However, it must also be considered how to motivate the less autonomous student as control-oriented individuals did not respond as well to intrinsic motivation.

With regards to the link between gamification and motivation this has been proven by the work of Orosco (2014). It was found that participants express enjoyment at seeing their achievements in comparison to their peers via points, badges and leader boards. While this study was centred on the study of training adults in the workplace, the motivational theories are analogous to a constructive learning environment where students are active learners. One where they are conducting their own activities, in their own way, in their own time, collaborating with their peers, expressing their ideas, thoughts and taking responsibility for their own work towards tasks and learning objectives (Dinder, 2015). as highlighted by the self-determination theory espoused by Ryan & Deci (2000).

Expanding on intrinsic motivation, Moldovan (2014) writes about fear of consequences, curiosity and ambition as being common to all students and factors that can be cultivated by educators to better facilitate effective self-regulated learning. If these aspects can be leveraged to promote more autonomous learners, then intrinsic motivation can also (Perry & Steck, 2015:129), lead to 'a learning environment that encourages students to increase their level of self-efficacy can facilitate greater use of self-regulated learning and cognitive strategies and subsequent success in actual task performance and academic achievement'.

2.3 Learning Strategies (Cognitive and Self-regulation) and Gamification via Technology

Self-regulated learning is described as, 'an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate and control their cognition, motivation and behaviour, guided and constrained by their goals and the contextual features in the environment' (Boekaerts et al., 2000:453). This, and students' independence and knowledge of their own cognitive strategies (metacognition) is arguably a major goal of all teachers and students and is divided into the following areas by Schunk (2005:86-87): forethought, planning and activation; monitoring; control; reaction and reflection. Considering, however, that this study was centred on participants of ages 8-11 one can only expect so much sophistication in the comprehension of these processes. The concept of integrating gamified elements into a classroom environment is essentially to utilise all the previously discussed theories to make learning more fun for a student.

Thus, it encourages him/her to willingly engage more with the learning, the vehicle for which is an online platform, where the result is enhanced student achievement or more positive student learning behaviours (Greaves et al., 2012). The platform can change, however, non-traditional ones such as Wikipedia or Classcraft can be beneficial regardless of gamification elements being used or not (Orosco, 2014). There is strong evidence however, between game-based learning and standardised test scores in some of the key areas of school and student success measures, i.e. Language, Maths and Science (Tomaso, 2014).

Such self-belief that measurable and recordable progress and successes in game-based learning activities, no matter how small, can be beneficial to a student and lead to many positive effects. Harrold (2015:159) found that perceived improvement on self-efficacy, personalised experiences, freedom to fail, motivational game-elements and the visualisation of abstract concepts were the most potent elements of the gamified classroom. Moreover, Valtonen et al. (2017) highlight how these new tools and opportunities exist within the TPACK model and could be applied to improve a student's cognitive skills and self-regulation through the development of his/her own content knowledge, pedagogical knowledge and various forms of technological knowledge.

Additionally, Ryan et al.'s (2006) study into video games through the lens of self-determination found that there were many positive elements related to playing video games. Although not directly related to education, the short-term well-being and sense of achievement when a reward was received led participants to invest more energy and time into learning some of the mechanics behind the game in order to maximise their investments. This is a very sophisticated behaviour and requires target setting, planning, monitoring and reflection (Ryan et al., 2006) all previously identified cognitive strategies that require self-regulation (Valtonen et al., 2017). Jabbar & Felicia (2016) state that these techniques are all present as scaffolds in many game-based learning programs and help to motivate students to success though gameplay. One could also argue that experiencing scaffolds like this and understanding how they work, could assist students to form their own scaffolds and increase their self-efficacy.

However, as highlighted by Mabel et al. (2006), enhancing any educational process with technology requires sound understanding of the pedagogical principle specific to the use of technology in an instructional environment. Combining these two disparate elements, that of facilitated student success, and the use of technology via gamification is still an area of deep discussion and interest, especially considering the greater availability of emerging technologies

such as Virtual Reality and the implications they have for the contemporary classroom (Greaves et al., 2012).

2.2 Engagement (Behavioural, Emotional and Cognitive) and Gamification via Technology

The first mention of the conceptualisation of engagement in relation to students and schools appears to have been by MacGowan & Mosher (1985:1). They concluded that it can be defined as 'existing when students are participating in the activities offered as a part of the school program' (MacGowan & Mosher, 1985:1). It can be divided into the following framework: attitudes leading to participation; is composed of multiple interactive determinants; has an impact on many school and student outcomes; and that research should be longitudinal rather than cross-sectional. Thus, it can be argued that applying this to a more modern context of 21st Century schools, establishes that student engagement is a vital constituent of any measure of school, or student success and thus, should be given consideration regarding the learning environment, lesson design and technology integration.

It is, therefore, not surprising that student engagement can be described as the 'holy grail of learning' (Sinatra et al., 2015:1) and 'is a fundamental concern for many school districts and teachers' (Akers, 2017:28) and that many research articles have been published on the topic. With refinement towards technology use and student engagement, several trends emerge of which the use of gamification is one.

For example, Çakıroğlu et al. (2016:105) discovered that engagement was impacted by motivation which was also a key factor in the overall learning process, highlighting the importance of increasing student motivation. Çakıroğlu et al. (2016) found that the combination of gamification elements such as leader boards, digital rewards and student-led quests could provide a considerable positive impact on motivation and thus engagement. Additionally, there was evidence of positive impact on achievement linked to engagement via gamification.

Of all the gamified mechanics used to increase engagement, virtual goods or cosmetic apparel for one's avatar appear to have the most significant impact (Chang & Wei, 2016). Outside of education, this can be seen with the phenomenal success of games like Fortnite. It was reported that such virtual goods, with no other purpose than that of vanity or decoration generated a revenue of $100 million in just 90 days via the use of in-app purchases (AppleInsider, 2018). The use of these virtual goods can be described as a true intrinsic

motivator as they are not gifted by the teacher, rather they are purchased with virtual currency earned in association with additional tasks or behaviours in addition to those expected of the lesson or activity. They can, therefore, work independently of extrinsic motivators though ultimately towards the same goal (Lemos & Verissimo, 2014).

Student engagement itself can be said, then, to be a large topic in and of itself. Davis et al. (2012) state that it can be separated into the following three categories. Behavioural engagement that describes the effort, persistence, compliance with school expectations and levels of participation. Cognitive engagement, relating to how students employ learnt skills and strategies in the completion of their work. Emotional engagement, which although 'less consistently defined by educational researchers' (Davis et al., 2012:24) can be summarised as the feelings of interest, anxiety, happiness and anger during activities related to achievement, (Skinner & Belmont, 1993).

It is clearly established that students demonstrating positive involvement or engagement with learning activities also challenge themselves (Skinner & Belmont, 1993), select tasks at the edge of their own competencies and invest considerable effort in order to succeed and exhibit positive emotions such as optimism, enthusiasm, interest and curiosity. When these aspects of motivation and engagement are identified and combined with sound pedagogy and cognitive principles a teacher can target a less intrinsically motivated student and use strategies more suitable to that individual (Lemos & Verissimo, 2014). That may be in the form of other gamified engagement mechanics, or indeed their exclusion with a greater focus on other beneficial aspects of technologically enhanced learning as described by Swann (2013).

2.4 Gamification, Motivation and Engagement

Faiella & Ricciardi (2015) analysed and synthesised some existing research that highlights contentious issues and better defined the subject matter around gamification. Much of what they write makes use of secondary references but is of use in this work in an effort to further clarify and expand the issues revolving around the meaningful engagement of students and gamification. Faiella & Ricciardi (2015:15) suggest that gamification, 'can produce a learning situation characterised by a high level of active engagement and motivation, which in turn produces positive outcomes in cognitive emotional and social areas'. While this statement itself is not backed up with their own independent research, there are numerous studies contained within their work that do so and can be shown to be in synergy not only with sound pedagogical methodology, but also offering major caveats and guidance for practitioners wanting to utilise

gamification in their own classrooms. For example, Faiella & Ricciardi (2015:15) state that a ‘substantial body’ of research indicates game elements introduced to learning activities can only increase motivation (and therefore engagement as previously described) when they make boring tasks fun. Used extrinsically or too excessively they can result in reduced enthusiasm, findings that are in line with the self-determination theory (Deci et al., 1985).

Moreover, Haanus & Fox (2015) build upon these warnings and propose positive arguments. In their longitudinal study of two academic groups, one with a gamified class and the other a control group, they found that offering seemingly intangible rewards to already well-motivated and self-interested pupils could result in: reduced levels of motivation; empowerment and satisfaction; and reduction in final exam grades because of intrinsic motivation no longer being present. It must be remembered, though, that this was a study of older students, paying for and already willingly undertaking a higher education course. It can be seen, therefore, that gamified online learning platforms can fulfil many students’ needs in education and aim to make the experience inherently fun. Carmichael (2016), following her own research and discussion with other educator-researchers, proposed the following seven ways in which video games fulfil a student’s needs. Autonomy is the freedom to act explore and create in ways that suit them. Competency relates to rules and mechanics that are balanced but need to be mastered. Social relationships entail communication and collaboration or competition. Discovery takes into account their curiosity and wonder in a virtual world. Surprise encompasses not knowing what is going to happen next and keeps them coming back. Feedback is instant, regular and automated, far more than a real human could give. Storytelling is a well-crafted narrative designed to lead participants through a range of emotions.

These aspects in gamification of intrinsic and extrinsic motivators are well-documented as basic psychological needs (Brühlmann, 2016) and offer a vehicle through digital rewards to affect motivational processes and self-regulated learning (Schunk 2005). They also make use of a students’ goal-orientation beliefs (Pintrich & Schrauben, 1992). The findings of Bear et al. (2017) further support the use of praise and rewards for development of digital relationship and interactions, an essential skill for 21st Century learners (Becker et al, 2016) by motivating prosocial behaviours.

2.5 Conclusion/Summary

In this chapter, there was a discussion of the gamification of student learning activities using an online platform maintained and personalised for the student by the teacher, accessed via a student's own device brought daily to school. The implications on students' independence, achievements, self-efficacy and self-regulated learning were explored, as well as how educational technology knowledge and sound pedagogical knowledge are vital tools in a contemporary teacher toolkit. In the next chapter, the methodology and research approaches used in this study will be discussed.

Chapter 3: Research Design and Methodology

3.0 Introduction

In this chapter, the research methods and approach will be discussed. Firstly, the epistemology approach will be discussed followed by the research design. The sample population, design of the survey, data collection and analyses are presented. The chapter ends with a discussion of the limitations of the study, the generalisability, validity and reliability of the study; and a discussion of the methodology in retrospect.

3.1 Epistemology or Ontology Approach

With any academic research, certain assumptions or decisions on approach must be made from the onset (Yilmaz, 2013). From both a philosophical and scientific standpoint the decision was made to base the study on definitive measurable (quantitative) data, have causal explanation and make predictions. Thus, positivist and epistemological approaches were used. When applied to the quantitative nature of this study, the goal of this research was to investigate facets of human behaviour in an aim to supply proof and validation of a hypothesis in order to define the causes of said human behaviour (Ulum, 2016). This more succinctly identifies the nature of the study as quantitative and reflects the more detached and impartial perspective of the researcher (Yilmaz, 2013) further validating the need for a positivist and epistemological approach.

3.2 Research Design Methodology

3.2.1 Quantitative Research Methodology

A quantitative research methodology was chosen for this study primarily as the study merited a mathematically based data-driven study that would afford statistical validation of the hypothesis via the use of a standardised instrument with pre-determined response categories (Yilmaz, 2013). Creswell (2002) highlights the importance of quantitative research and its value in identifying trends, examining cause and effect relationships from an objective and unbiased approach. A disadvantage with this type of methodology, however, is its dependence on data and its subsequent analysis (Creswell, 2002) for, while this provides powerful tools for investigation and validation, it also relies on the sometimes-difficult task of gathering consistent

data within a school environment. In the case of this study, the required correlation of both pre and post-tests with participants' consent that must be signed and returned by a parent or guardian.

3.3 Action Research

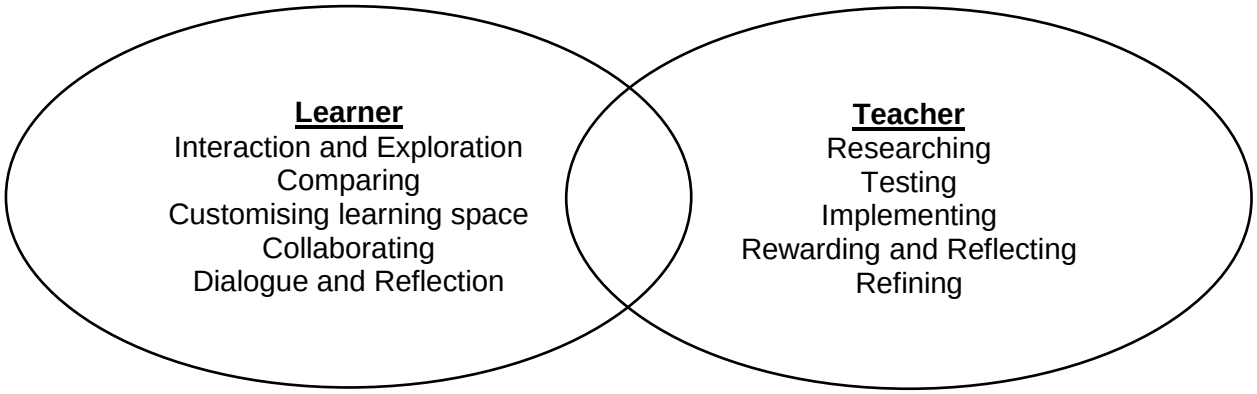
The seeking of a practical solution to a pre-existing problem though data collection and analysis within one's daily educational workplace is termed action research. Defined by Creswell (2002), action research contains the following key elements. A practical focus undertaken as part of the educator's-researcher's own daily practices. This includes collaboration; a dynamic process; action plan for implementation; and the sharing of research. It also fits broadly into two categories: practical and participatory. With participatory action research, the researcher focuses on a problem that affects a significant segment of the populace and has an organisational or community focus (Creswell, 2002). This work fits into the practical category where the teacher is also the researcher, focusing on a closer or more local issue and was designed to offer a possible solution aimed at improving the integration of technology into teaching and learning in the author's workplace.

In relation to this study, the major advantage of this type of research is that it has the possibility to offer an immediate solution tailored to a very specific contextual problem. This could then be shared via professional development offering very real improvements to the learning environment. This specificity, however, is also its major disadvantage, for it is very unlikely that other educators will be facing the exact problem in the same situations, diminishing its overall significance.

Sagor's (1992) model for Action Research was initially used following the 5-step process. The collaborative steps of this method being: problem formulation; data collection; data analysis; reporting results; and action planning. These steps seemed ideal as they followed a logical process that was easy to implement within the timeframe permitted for this research and limitations of the academic year. Additionally, the two guiding principles of data collection and the issue being within the scope of the educator/researcher (Sagor, 1992) met the requirements. However, it was apparent early on that a single person setting the rewards was not seen as 'fair' by the students and thus the actual gamification of individual tasks and their rewards followed an adapted model developed by Majgaard et al. (2011). A combination of Action Research and Design Based Research, where teacher and students participated as both

learners and co-designers (see Figure 2). This afforded the ability to both design and refine the system of implementation with successive classes and in some cases personalising it over successive weeks to get the best balance of work versus reward in the short-time frame available. While not used before is the same circumstances as this study, its combination of sound pedagogy, direct input from multiple parties and observation of emerging goals has seen success in several works involving younger children and adaptive uses of technology for educational purposes. (Majgaard et al., 2011).

Figure 2: Teacher - learner research participation modes



3.3.1 Action Research Procedure

The students were taught in the same manner as they are accustomed to and no deviations from that were made for this study. However, to facilitate smooth and consistent instructional material delivery and review, the gamified platform and submission systems were duplicated and linked such that students could choose to use the traditional VLE they have been using all year (Google Classroom) or interact with the gamified platform (Classcraft).

Just as in any other video game, participants in Classcraft have different statistics that reflect their progress or success. These Core Motivators; Hit Points, Experience Points and Gold Pieces (HP, XP, GP) are at the heart of Classcraft and are interwoven into all the other features (Classcraft, 2018). They make use of the self-determination theory and act as core motivators that follow research-driven elements of gamification that have been proved to work by making learning applications more fun (Ryan et al, 2006; Halvorsen, 2013). Through this method students could access the same functionality and resources as the normal VLE (Google

Classroom) but also the motivational content discussed above, such as points and digital rewards in the form of cosmetics for their avatar.

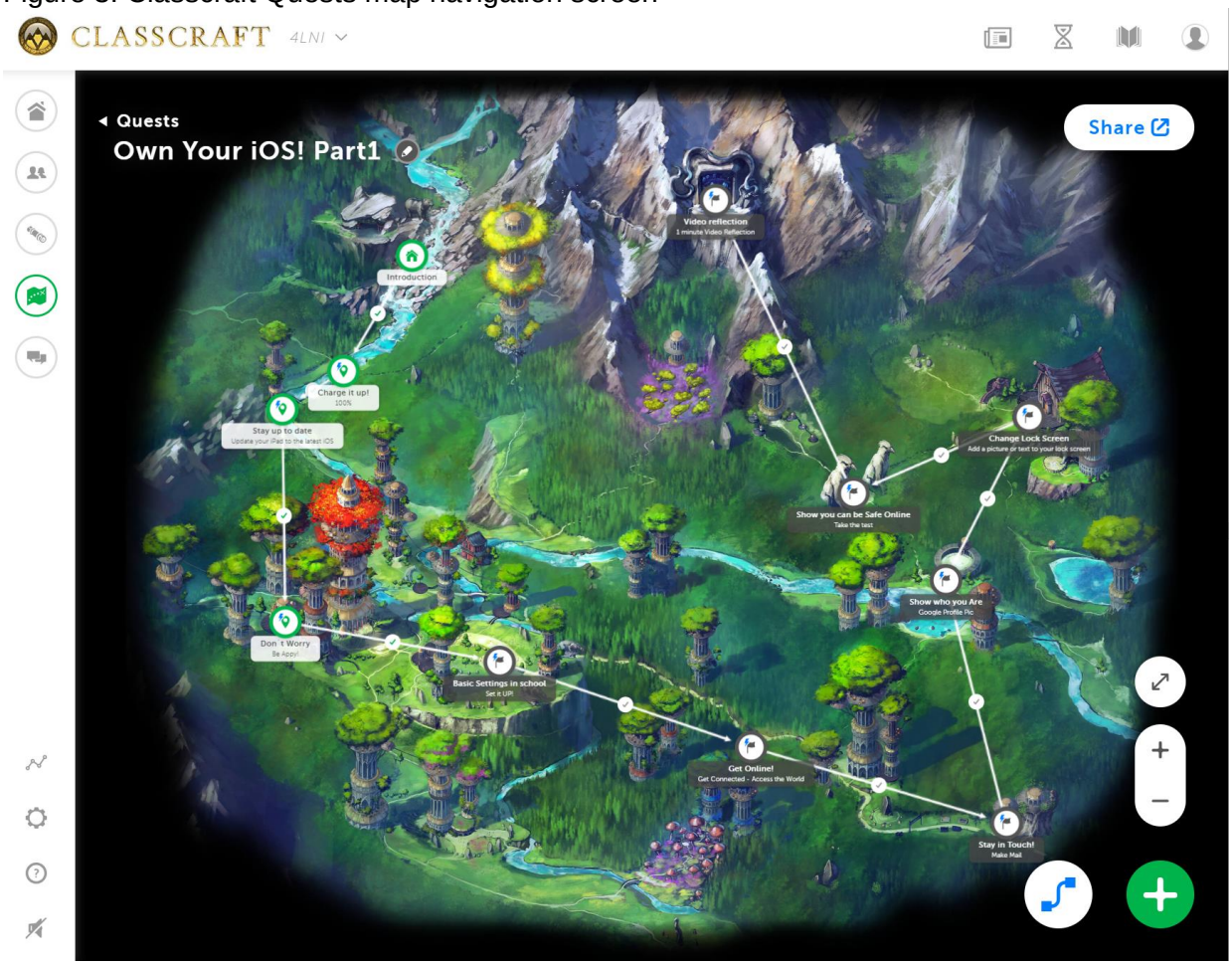
This process took place over a 6-week half-term and varied slightly for each year group according to the unit of study. However, the gamification of the mandatory tasks was consistent and were accessible in sequence matching the lesson plans, with additional developmental activities accessible in parallel. An example of this structure can be seen for year 4 in Table 1.

Table 1: Process of Gamification

Year 4 Healthy Living unit - create a webpage to evidence and share learning			
Date	**Required Task: "Create and maintain a website"**	**Gamified (quest) reward: "Tell your tale"**	**BYOD Voluntary developmental tasks: "own your iOS"**
15/4/2018	Create a Google Site	100xp + 10gp	Charge it up (upload a picture of 100% battery at 8am)
22/4/2018	Complete About Me page	100xp + 10gp	Stay Up to Date (Upload a picture of iOS version and apps installed)
29/4/2018	Complete Teeth page	100xp + 10gp	Stay in touch (Sign in and sync school mail & Google apps and send a short message to teacher)
13/5/2018	Complete Digestive System page	100xp + 10gp	Change Lock Screen (Add a suitable lock screen with school and class name in case you lose your iPad)
20/5/2018	Complete Book review and link learning from Demon Dentist Class Novel	100xp + 10gp	Video Reflection (Upload and share a video about your thoughts and feelings on using Classcraft instead of Google Classroom)

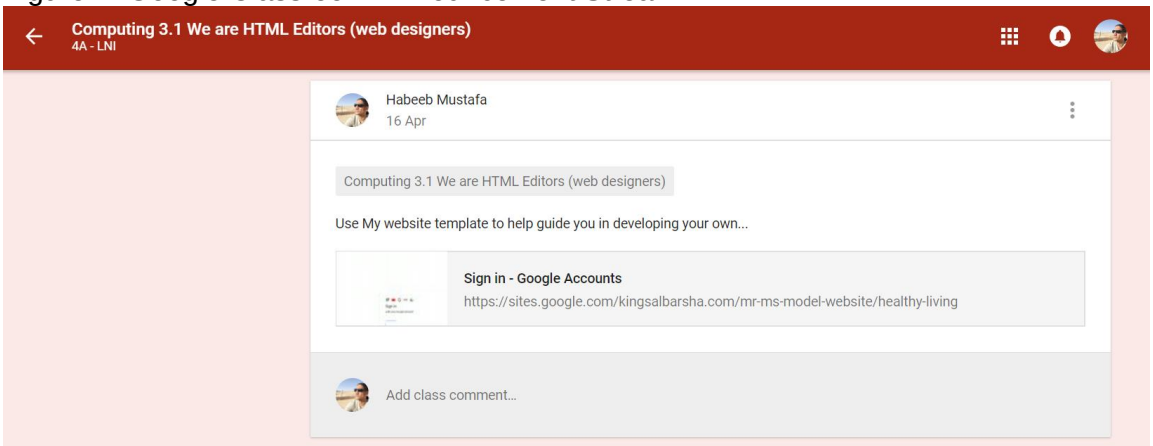
Represented graphically in Figure 3, the map-based Quest structure and engaging presentation of Classcraft based tasks are designed to be very appealing to younger students (Classcraft, 2018).

Figure 3: Classcraft Quests map navigation screen



There is a drastic contrast to Google Classrooms' announcement stream as seen in Figure 4. Which, while having some appealing aspects such as reverse chronological order, similar to social media streams, was found to be less attractive graphically to younger students, especially on the smaller screens of iPads.

Figure 4: Google Classroom Announcement Stream



The overall learning objective for this example unit was to combine the use of BYOD in classroom activities with that of The Google Suite productivity tools in computing lessons. This was achieved by uploading work completed in class from iPads to students' Google Drive accounts. They were, then, incorporated from there to their own Google Sites website via desktop computers. Instructions and modelling were presented for each stage at the start of a class via traditional teaching methods and modelling but was also accessible via the VLE. Each stage was completed in turn and evidence provided with screenshot uploads. In addition, successful uploads to Classcraft were rewarded with Experience Points and Gold Pieces, the virtual currency that the platform uses which can be used by students to purchase pets and cosmetic apparel for their avatars. This implementation and reward structure was chosen on the basis of work by Liu et al. (2017) and their findings that real world systems can be re-engineered to make them more engaging and productive with the end result a form of engine of happiness (McGonigal, 2011) aimed at meeting students' needs and wants.

3.4 Sample Population and Description

Due to the nature of the study and its limitation on having to be carried out in school with the required technology and online platforms, convenience sampling was used. As described by Etikan et al. (2015) this consists of inviting willing participants that are easily accessible to the researcher. Although the entirety of years 4, 5 and 6 were invited to participate, only 44 students completed both the pre and post tests and returned the participants' consent forms signed by a suitable parent/guardian. In addition, the students, the class teachers from year groups 4, 5 and 6 were also invited to participate in their own pre and post surveys, of which 15 teachers chose to participate.

To further elaborate on the background and nature of the participants, demographic data was taken from the students' record databases up to June 2018. The data does not contain any identifiers and has been summarised into three categories: gender; nationality; and academic ability (Reading, Writing & Mathematics). Figure 5 shows that of the participants, 56.8% were female and 43.2% male. Showing that a greater proportion of female students than males completed both the pre and post-tests, as well as returning the consent forms.

Figure 5: Student Participants' Gender

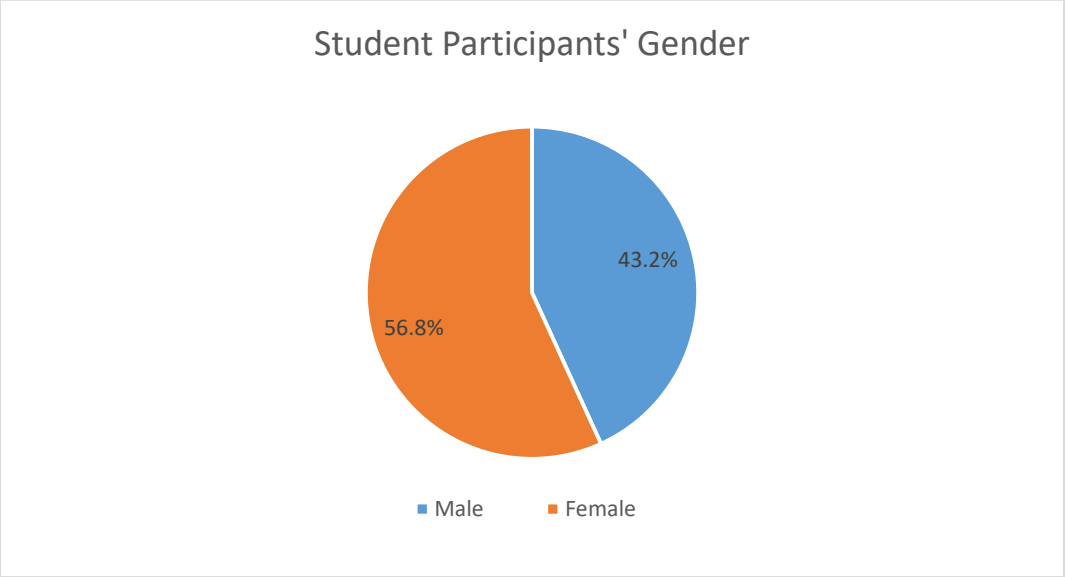


Figure 6 shows that the nationalities of the participants' data included for analysis, indicates a slightly disproportionate number of British, Egyptian and Pakistani students that completed both the pre and post-tests and submitted signed participants' consent forms.

Figure 6: Student Participants' Nationality

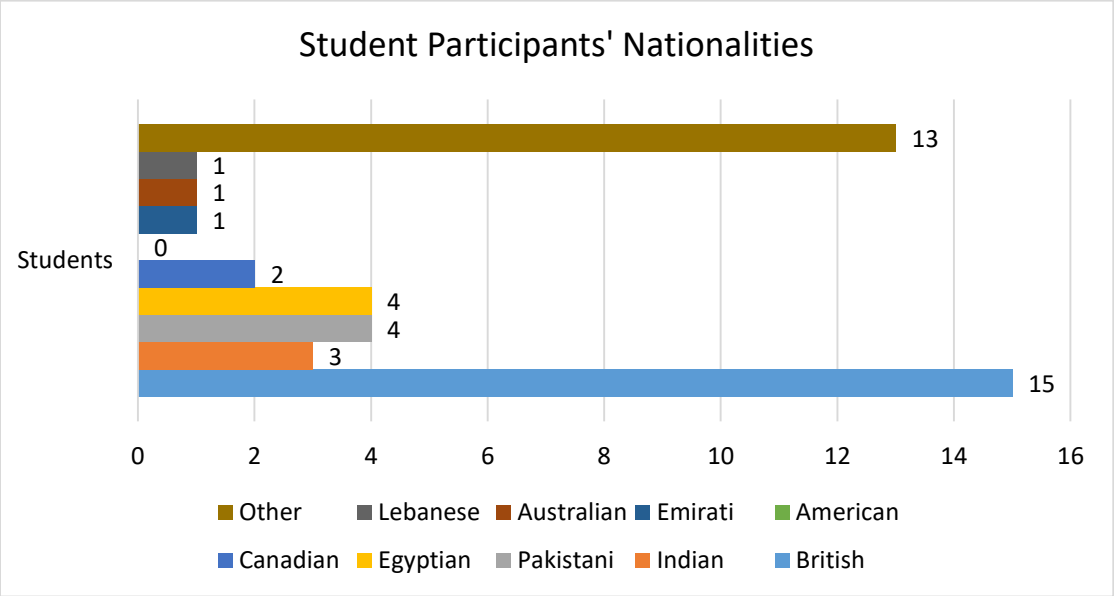


Table 2 shows a snapshot of the academic abilities of the students from years 4, 5 & 6 (the participating year groups) and shows their academic abilities as reported by class teachers for reports at the end of the year 2018 evidenced by standardised assessments from GL education (Gl-assessment.co.uk, 2018). The three core subject areas are: English Reading, English Writing and Mathematics and the students were either graded as: at age expected ability; above age related ability; or for Mastery as described by the UK National Curriculum. As can be seen, most of the students are above the age-related ability, this reflects the nature of the school as private and selective with stringent entry requirements, though allowances and accommodations are made for students with Special Educational Needs and there are many provisions also for students that are More and Exceptionally Able (MEA).

Table 2: Students' Academic Ability

Year Group & ability level	Number of students		
Year 4	**Reading**	**Writing**	**Mathematics**
Below age ability	13	19	11
At age ability	55	69	57
Above age ability	31	26	36
Mastery	30	15	25
Year 5	**Reading**	**Writing**	**Mathematics**
Below age ability	34	39	32
At age ability	54	53	53
Above age ability	33	30	31
Mastery	16	15	21
Year 6	**Reading**	**Writing**	**Mathematics**
Below age ability	14	20	14
At age ability	46	56	47
Above age ability	40	31	39
Mastery	27	20	27

3.5 Questionnaires/Surveys

3.5.1 Design of Questionnaires/Surveys

The choice of surveys as a suitable quantitative data collection method was made after reviewing Punch's (2009) discussion. He states that when examining a cause and effect relationship, a correlational survey allows a researcher to look backwards to analyse the impact of an intervention. However, the nature of working in education with children as voluntary participants severely constricts the researcher into being reliant on meeting the ethical requirements for participation.

The surveys used were based on Pintrich`s (1990) theories of self-efficacy and motivation. A Motivated Strategies for Learning Questionnaire (MSLQ) was used to gather data from students' pre and post-tests. This data was supported by quantitative pre and posts surveys of their teachers' perceptions of their students in the pre and post conditions. Studies involving MSQL as an instrument generally follow a 7-point Likert scale and have questions focused around motivational beliefs and self-regulated learning strategies (Pintrich & De Groot,1990) and the

School Engagement Scale (Fredericks et al., 2005). The instrument was adapted to be more appropriate to the participants with questions focused around motivational beliefs (self-efficacy and intrinsic value), learning strategies (cognitive and self-regulation) and engagement (behavioural, emotional and cognitive). The questions were written in a child-friendly manner and no technical terms were used, save three sub-headings for the Google Form. They were: motivation; learning; and engagement (see Appendix D). The pre and post surveys contained the same statements and questions, with only the tense or condition of before or after the implementation of Classcraft being changed.

3.5.2 Data Collection of Pre and Post Questionnaires/Surveys

The questionnaires were distributed to students via both Google Classroom and Classcraft, with the participant consent forms (Appendix C) sent home as a letter for signing by parent or guardian. Links to the staff surveys were distributed by internal email with consent information attached. The surveys were opened from the 19th March 2018 to the 22nd April for the pre-surveys and the 15th May to 5th June 2018 for the post-surveys. In general teachers completed their surveys in under 10 minutes and students, between 15 and 20 minutes.

3.5.3 Data Analysis of Pre and Post Questionnaires

The pre and post-tests, once collected and disassociated from any identifying information, were analysed via the use of SPSS with paired t tests (Langdridge & Hagger-Johnson, 2009:248) and frequency distribution (Langdridge & Hagger-Johnson, 2009:214) tables output for analysis against the hypotheses.

The paired t tests were used to correlate any significance in the data beyond mere chance and is output as a numerical figure of 2-tailed significance. (Langdridge & Hagger-Johnson, 2009:249) Often termed as *p* value, significance between two tested conditions (or pairs) exists when these p values are calculated as less than 0.05. Statistical tests like this, conducted on data collected from pre and post-tests are well established and accepted means of determining average changes in score, used widely for analyses in social sciences (Hedberg & Ayers, 2015).

However, due to lack of significant findings (possibly due to the number of students that had to be excluded due to consent forms not being returned), frequency distribution was also used to

easily identify where most participants placed their responses and manually compare the pre and post-tests data for discussion.

3.6 Ethical Considerations

Ethically, as there are no guidance practices for the workplace or geographical location in which this study was conducted, the research was conducted in line with the British Educational Research Association (BERC, 2011) and The University of Roehampton ethics procedures for research work (Appendix A). Additionally, participants' consent was requested from students and their parents/guardian. The form was distributed on paper and electronically and required informed consent from the students and a representative adult. As such, it follows University of Roehampton's guidelines (Appendix A).

3.7 Limitation of the Data Collection Process

Due mainly to the voluntary nature of participation in this survey and its total reliance on good data, there were several limitations that hindered its implementation and should be considered if this research is to be replicated.

Time

With only eight weeks to gather data and implement the platforms, there was not enough time to get it fully embedded for both students and teachers. This resulted in just scratching the surface of investigating the full potential of a purpose-built and well-developed platform like Classcraft.

Curriculum

There were limitations imposed by the academic calendar and pre-planned units of study that had to happen in the same time-frame. Additionally, with field trips and productions there were instances where activities did not take place consistently across a year group that could impair or skew the data from one participant to another.

Children and consent

The fact that this study was carried out with children as participants required adult consent and this resulted in reduced numbers for data analysis. The nature of convenience sampling and

voluntary participation may result in a slight bias, with those students that were not interested or have been slightly disaffected for whatever reason, not completing both tests and/or returning the consent form. It should be acknowledged that this could have skewed the student results towards the positive and resulted in the poor significance as shown in Chapter 4 via the paired t-tests as students reported very little change in the pre and post conditions.

3.8 Data Reliability, Generalisability and Validity

Although it can be assumed that the data gathered affects honest answers on behalf of the participants, it must be acknowledged that, for the most part, the participants are between the ages of 8 and 11 and are not invested either way in the outcome as they may not be at the school next year, such is the transitory nature of International School students. One must also consider that they may not have remembered their previous answers. Thus, although they may have answered truthfully at the time, such limited snapshot answers could be more reflective of their immediate thoughts and feelings on the day than of an accurate reflection to the true nature of the study.

It must also be mentioned that there were numerous inconsistencies with time spent, tasks completed, and lessons missed due to various school events and timetabling factors. Additionally, inconsistencies in how teachers embraced and/or did not embrace the new platform were evident, this co-implementation, or lack thereof could also affect the validity of the data. This is an unavoidable side effect of the voluntary and collaborative nature of action research with regards to the joint construction of knowledge and ‘resistance to changing the way of working as a group’ (Fernández-Díaz et al., 2017:11). This could have been offset if successive iterations of implementation were carried out, but the timeframe of the research did not allow this. Although the situation in which the study was carried out was quite specific, the findings should be transferable and repeatable to any organisation that faces the same problems of underutilisation of available educational technology such as BYOD in similar age groups.

3.9 Methodology Evaluated in Retrospect

Consulting the literature, most notably Creswell (2002), if this research were to be repeated, it is recommended that surveys and implementation be more tightly controlled and organised by the educator-researcher. For example, in the case of this work, consent forms and surveys were

carried out of the timetables Computing class slot and relied on the class-teacher and students themselves to complete in an orderly and time sensitive manner. It is also recommended that the student survey be truncated somewhat. Moreover, the results should be made available as a refresher in order to enable the participants to better reflect on what effect the implementation of gamification actually had on teaching and learning, both in relation to their use of BYOD in specialist and core classes. These could be subdivided into two or more studies to be even more specific to the student rather than the setting and thus more significant.

The pre and post-tests that were used to gather the data from students and staff for this study were a pivotal aspect of the entire study and although small pilot study was conducted on them before implementation, it did not include a wide enough sample of the possible participants to have meaningful impact. In retrospect, some time before the study and as part of the instrument development process (Creswell, 2002), a pilot should have been conducted with larger numbers and repeated after the implementation of a gamified element. This would have allowed for refinement of the questions and statements that could have resulted in more data or more meaningful data being collected within the allowable timeframe.

On the matter of Action Research, Creswell (2002:587) states that 'the key idea is that the researcher `spirals` back and forth between reflection about a problem, data collection and action'. Measuring this with quantitative data alone can lead to inconsistencies, especially if data is not collected at the same time across all participants. Thus, it is suggested that some more qualitative element be used, or data collection be more rigorous and time sensitive with a clearly laid out schedule of distribution and collection. This would, in turn, require greater support from the organisation's administrative structure and could be too great a task for a single educator-researcher.

3.10 Summary

In this chapter, the process and rationale for the study and its data collection, the nature of the participants and setting, sampling methods, data analysis and an evaluation of the methodology were discussed. In the next chapter, the results and an evaluation of the findings will be presented.

Chapter 4: Results, Analysis and Evaluation of Findings

4.0 Introduction

In this chapter, the process and finding of data analysis from the students' and teachers' pre and post-tests will be discussed.

4.1 Pre and post-tests survey correlation and significance

Although the data for this study was gathered from two sets of participants, it all pertains to the same pre and post conditions. That of the pre-established method of lesson delivery and that of delivery via gamified platform. Both surveys used an adapted MSQL instrument with students answering the surveys directly from their own perspectives and the class teachers as general observations of their classes. Initial analysis for significance of the pre and post question/statement pairs was completed using a paired t test via SPSS, the results of which shall be discussed briefly here, with their significance as relating to the research later in this chapter.

4.2 Students' Data

The students' pre and post survey questions can be found in Appendix D. A student with high scores indicates agreement with the statement and positive aspects of a students' motivation, engagement and learning strategies, and a low value corresponds to less desirable elements. The exceptions to this are the negatively coded questions 'When I have a problem with my iPad I go to an adult for help before trying to fix it myself', 'Sometimes I just act as if I am working', and 'I am often told off in class'. For this reason, these questions were excluded from any cumulative score analysis. Of the three year groups, 44 students took both the pre and post-tests, as well as submitted a correctly completed consent form signed by parents/guardians.

A paired sample t-test (Langdridge & Hagger-Johnson, 2009:248) via SPSS tabulated the scores for the individual questions of the students' pre and post-tests section by section to determine the significance. The results can be found in Appendix E. Considering a p value of less than 0.05 as being significant, only one question pair met the criteria and even then, only marginally. That was the Cognitive Learning Strategy statement 'I know the username and password for my schools' email' with a p value of 0.042.

This is significant as it was the only detail required by students to independently log in to the Gamified Classcraft system. However, it is not one that can be considered for this study as, in retrospect, many of the students' logon details relied on an identification number visible on their school's identification cards and an often-generic password that could have been easily guessed, shared with a friend or noted down for use later. Thus, for this study, the students' data must be found to be inconclusive. There is, however, one possible conclusion that can be proposed. Students that were intrinsically motivated to participate in the study (taking the time to complete both surveys and return the consent forms), are students that would not have been visibly affect by the extrinsic motivational aspects of gamification.

4.3 Staffs' Data

The staff's questionnaires consisted of the pre-tests taking place before the implementation of a gamified platform and generally indicating the severity of the problem stated in Chapter 1. The questions themselves can be found at Appendix D and were answered via a 5-point Likert scale. Thus, as with the students' tests, a higher score represents stronger agreement with a statement, reflective of desirable conditions across the three themes, motivation, learning strategies and engagement. The tests were delivered via an online system with the requisite participant consent information as the first screen.

Fifteen teachers answered with six from year 4, four from year 5 and five from year 6. The pre-tests were completed before implementation of Classcraft and the post tests were distributed approximately 6 weeks after the implementation of Classcraft as a gamified online learning platform used in the computing lessons. The teachers that took these tests were the actual class teachers that facilitate the core lessons of English, Mathematics, Science and Humanities and are all UK trained teachers holding Qualified Teacher Status. There is no school policy dictating how much technology should be integrated into their lessons, but the unwritten expectation is that they will make use of their students' BYOD wherever possible to enhance teaching and learning and encourage students to develop 21st Century Learning Skills.

Interestingly, the findings from the staff-based data are much more significant than the student data, with 3 pre/post question pairs showing significance ($p<0.05$) and 12 pre/post question pairs showing strong significance ($p<0.01$) as indicated by (Langdridge & Hagger-Johnson, 200) and found in Appendix F. These reflect both observations of students use with technology in general and how their own teaching and learning environments and interactions with their

students via BYOD tasks developed, becoming more efficient and rewarding. Delgardo et al. (2015) propose that this could be a result of the realisation of the many benefits BYOD affords a teacher once the various and numerous barriers have been overcome. A situation resultant of an increase in students' self-efficacy, brought about by the intrinsic rewards of gamification. Teachers' development of Technological Pedagogical Content Knowledge (TPACK) as it relates to their own practice and context of BYOD use in their own classrooms must not be discounted either, as the teachers were present in the computing lessons where a more sophisticated use of BYOD and gamification was modelled by the educator-researcher. Rosenberg and Koehler, (2015) note that the interwoven social interactions, scaffolds and supports that can affect teaching with technology can have a direct impact on better understanding of its practical use.

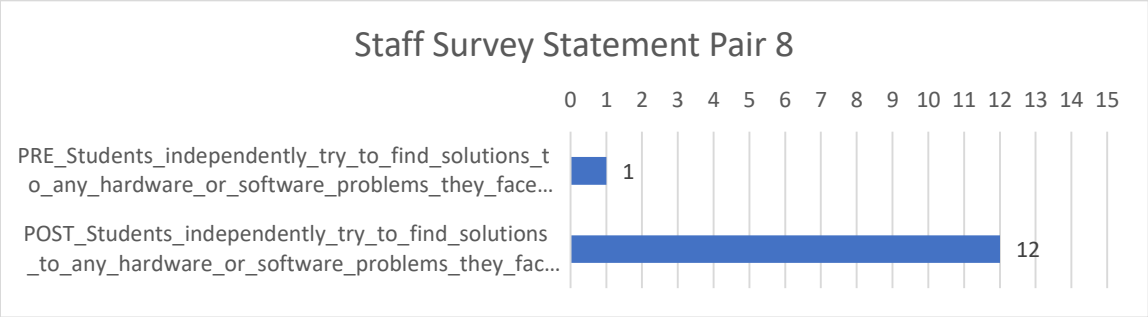
One question was shown to be have a p-value higher that 0.05, 'students show a general interest in technology' and thus shall not be considered individually in these findings. Additional space was given to teachers to give feedback according to the two questions; 'In your opinion what are the greatest benefits to BYOD in schools'? And 'In your opinion what are the biggest barriers to efficient and effective BYOD integration in schools'? The answers to these can be found at Appendix G and were useful in refining the problem statement and research questions. The results from the staff data were then compiled and tabulated using Microsoft Excel and the COUNTIF function (counting answers of categories that indicate agreement) for easy visualisation, found in Appendix H, they shall be discussed individually below. As the significance was determined by pairs of pre and post survey questions, this pair number may be used below in place of the full questions.

4.4 Quantitative Data: Staff Data

4.4.1 Motivation (Self-efficacy and Intrinsic value) and Gamification via Technology

Technical knowhow and independence are highly sought-after skills in 21st Century Learning environments and much sought after at college level in preparation for the workplace (Thomas, 2016). Regardless of how successful they are, students that try to tackle technical problems by themselves, before asking an adult must therefore be acknowledged and celebrated. Figure 7 shows that before the implementation of Classcraft, only one teacher observed this positive behaviour of their students.

Figure 7. Staff in agreement for Survey statement pair 8



This raises to 12 post Classcraft and corresponds to a positive learning environment that celebrates such behaviours in response to the motivational use of gamification elements.

Additionally, prior to intervention and as seen in Figure 8, eight teachers judged that their students exhibited good Digital Citizenship, an essential part of helping children to mature in an ever increasing online and interconnected world, as discussed by Marcovitz (2012) and advised by the International Society for Technology in Education (ISTE) confirming this as desirable and beneficial for both the students themselves and schools in general.

Figure 8. Staff in agreement for survey statement pair 15

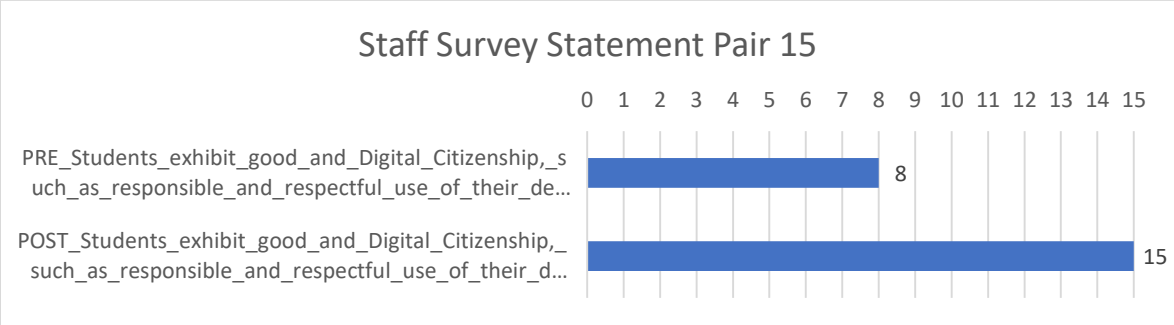
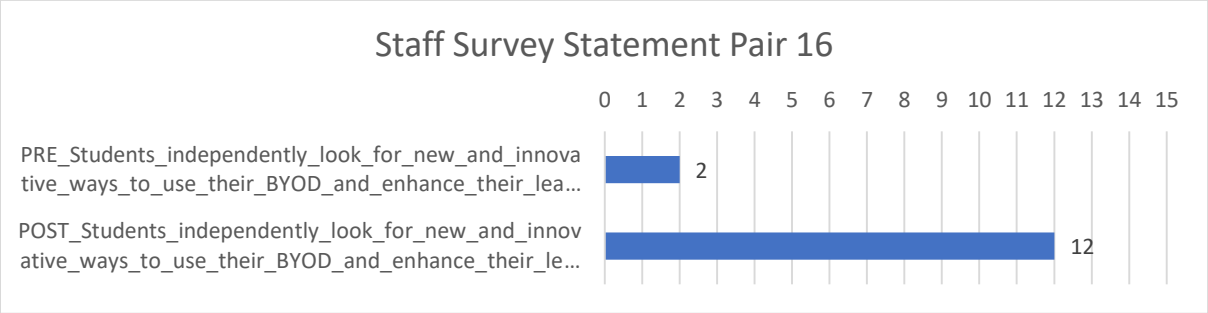


Figure 8 also shows that this number jumps to 15 teachers after the implementation of Classcraft and its class discussion facilities where digital rewards and punishments could be instantly applied and related directly to a comment or response. The possibility of interfacing in a very visible and meaningful discussion with an authentic audience, such as a class-teacher discussion about tasks or the school environment, is one benefit of using an iPad as described by Chan et al. (2006) confirming the beneficial use of BYOD and the useful impact that the fear

of consequences (Moldovan, 2014) for negative interactions can have, where a student is visibly sanctioned for displaying negative online interactions.

Prior to the implementation of Classcraft, tasks that specifically utilised BYOD were generally teacher led. Figure 9 correspondingly shows that the students of only 2 classes ever utilised their devices in a more sophisticated fashion than specified by the teacher.

Figure 9. Staff in agreement for survey statement pair 16



However, there was an increase in this level of sophisticated use of BYOD independently by students, six times as many, when they had a more open-ended method of submission and were rewarded digitally for doing so. Even without the offer of rewards, students were witnessed exploring new tools and aptitudes indicated by the level of their achievement within the computing lessons, the level of sophistication evident in their submissions and everyday interaction with technology in other lessons.

Such changes could be explained by the revised value or importance that students place upon their BYOD and computing tasks post gamification as described by Pintrich & de Groot (1990:33) ‘a value component, which included students’ goals and beliefs about the importance and interest of the task’. Therefore, the findings of this study corroborate the conclusions drawn by Pintrich & de Groot (1990).

Examining the teacher comments from Appendix G, this change in the revised importance of BYOD by students is observed by teachers, as a benefit of BYOD realised post Classcraft with regards to students’ independence, in their statements: ‘Engaging for all children and promotes the need for independence towards their learning, an area that needs to be improved across the school.’ (Teacher 9) ‘Children are enthusiastic and excited to use it. It helps children build independence in their learning.’ (Teacher 11) ‘Enabling student independence and development

of 21 Century learning values.' (Teacher 15). All positive aspects of working with technology in education and conditions desirable of a 21st Century teaching and learning environment (Thomas, 2016) and similar to the findings of other, similar, research as presented by Marcowitz (2012), Greaves et al. (2012) and Becker et al. (2016).

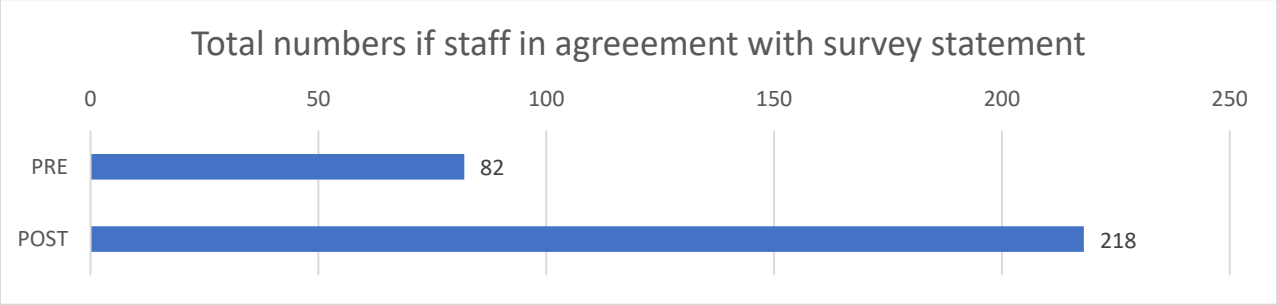
4.4.2 Learning Strategies (Cognitive and Self-regulation) and Gamification via Technology

There were several independent learning activities posted on Classcraft that rewarded successful completion of personal technical administration using BYOD tasks such as uploading a screen shot of their iPads fully charged, with apps installed and updated. These and other activities linked to the independent operation of more advanced settings and problem solving on their iPads (such as accessibility settings, app permissions or syncing of accounts) are indicative of a learning situation resultant in improvements to students' cognition.

It, then, becomes evident that students are more willing or effective at using their own minds and cognitive strategies in the solving of technical problems, as discussed by (Faiella & Ricciardi, 2015) due to the more entertaining nature of gamified tasks or instructional delivery in the form of digital map quests charting progression with associated rewards and clear time frames or deadlines.

Figure 10 shows that there is very large increase in staff that answered the Strongly Agree or Agree answer categories for the entire survey (see Appendix H) after the implementation of Classcraft as compared to the pre-tests.

Figure 10. Total numbers of staff in agreement with survey statements



Re-examining the survey statements in Appendix D and teachers' comments in Appendix G, nearly all are related to students' independently solving their own technical problems, thus

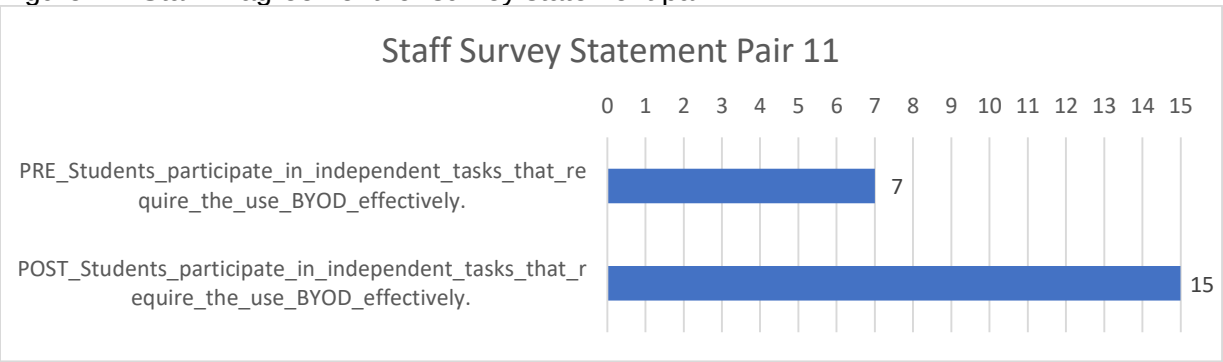
improving or making better use of their own cognitive strategies, self-regulation or technology in general. The use of gamification in this context seems to have capitalised on the curiosity aspect being at the centre of intrinsic motivation (Moldovan, 2014) and acting as a natural impulse to encourage students to explore what their BYOD can do for them in general and what they are capable of, given the task, some direction and a prospective reward.

The change in this independence and autonomy of young students resulting in desirable, positive achievement-related outcomes, has been seen to result in an increase in self-efficacy when one believes they possess the capabilities to perform a task successfully (Walker et al., 2018). This power of self-belief can lead to a more independent, capable and successful student, making the most of their own cognitive strategies and the tools or resources available to them as highlighted by Pintrich & DeGroot (1990).

4.4.3 Engagement (Behavioural, Emotional and Cognitive) and Gamification via Technology

As can be seen in Figure 11, only seven of the teachers agreed that students were participating effectively in tasks that required the use of their BYOD prior to the implementation of gamification via Classcraft.

Figure 11. Staff in agreement for survey statement pair 11

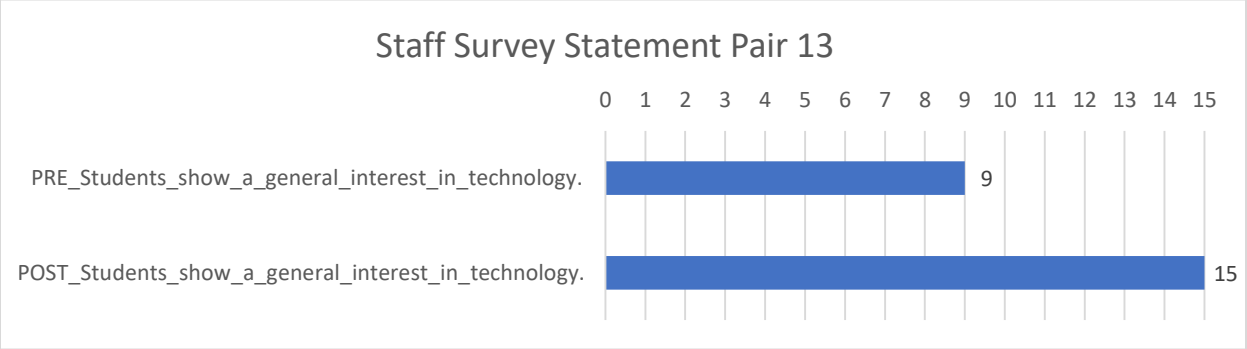


This contrasts strongly with the post test data where all of the teachers agreed that a much greater engagement with BYOD related independent tasks or learning activities was evident, conditions that have been seen to improve students' learning and collaborative skills in case studies by Greaves et al. (2012) Studies that concur with the findings of this work, especially where technology is integrated effectively into educational activities for younger (Upper Primary

School) students, most notably the easier implementation of personalised learning or enhanced interventions that meet the needs and wants of students, (Fullan & Langworthy, 2014).

Along with this increase of effective participation in tasks with BYOD, in general, Figure 12 shows that according to staff observations, only 9 classes of students demonstrated any interest in developing their own Digital Literacy skills independently pre-implementation of gamification via Classcraft.

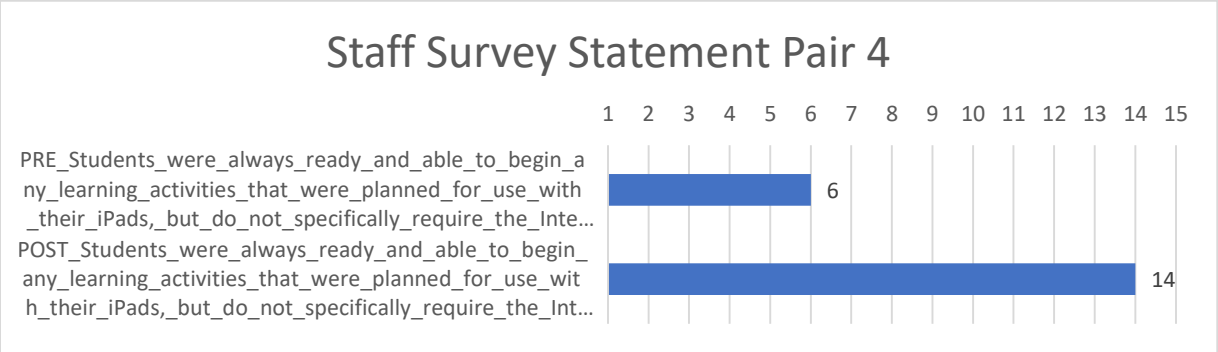
Figure 12. Staff in agreement for survey statement pair 13



After the implementation of quests and challenges via Classcraft this value rises to 15 classes and represents a general increase of development across all software and devices not just iPads and is indicative of a student populace more engaged with the benefits of a 21st Century Learning environment and more willing to participate in the types of activities and gamified mechanics it offers. The findings of Swann (2013) elucidate upon this and make clear that such increases in engagement are found more among extrinsically motivated students than by intrinsically motivated ones.

Although always a possibility, many tasks that are designed to use BYOD do not necessarily require the device to be connected to the Internet. The importance here is to determine any differences between merely having the iPad present and charged with the correct apps installed, to also knowing the login details to access the school's Wi-Fi and all the enhancements that connectivity offers. As can be seen from Figure 13, prior to gamification, only 6 teachers agreed that their students were always ready to begin learning activities.

Figure 13. Staff in agreement for survey statement pair 4



This increases to 14 after the introduction of Classcraft. This is most likely due to a combination of students having their iPad in school, charged and with the needed apps installed indicative of increased engagement as described by MacGowan & Mosher (1985), where engagement is said to exist when students participate in activities as offered by the school. More specifically where 'Online collaboration increases learning productivity and student engagement" and "Daily use of technology delivers the best return on investment' (Greaves et al, 2012:10). This shows that such benefits as increased student engagement and device independence realised by one teacher, are transferable across different lessons, contexts and teachers. If other teachers also invest the effort to enrich and enhance learning opportunities with technology.

4.5 Research Questions and Hypotheses Findings

Research Question 1: How can using BYOD improve the instructional delivery of lesson content for 8-11 year olds across the curriculum?

The use of BYOD in primary school can face many challenges, however, this study has found the following benefits evident from its thoughtful, well researched and methodical implementation: an increase in students' responsibility and accountability with such things as bringing in BYOD in a state which it is ready to learn and recalling logon details and passwords; development of teachers own professional practice and TPACK though the modelling, collaboration and experimentation with educational technology available when each of their students brings a device to school; improvement in class teacher discussions and the possibility of anywhere, anytime access to teachers and learning resources; improvements to digital literacy as students explore new apps, tools for learning and become increasingly collaborative

in their work and desiring of publication to authentic audiences; and greater student technical capabilities and awareness of the “fine tuning” a device via the manipulation of settings.

Research question 2: What impact does an increase in motivation by using gamified content have on students’ engagement with learning activities?

The use of fun, engaging learning activities and reward mechanics like those offered by a gamified VLE offer many opportunities to enhance a student’s experience and utilise the many possibilities offered by tablet devices like the iPads. Most notably this study found the benefits to be: improved student self-efficacy, independence, autonomy and use of self-regulation and cognitive strategies to complete a task or achieve an objective; increased preparedness for future learning and development of 21st Century skills and Digital Citizenship desirable in general in an interconnected world and specifically by colleges and work places; personalised learning experiences and “fun” tasks or ways of completing tasks result in an increase in engagement and achievement; developing the sophistication of use of technology beyond teacher requirements or modelling due to improvements of the perceived importance and celebration or rewarding of technical aptitudes and knowledge.

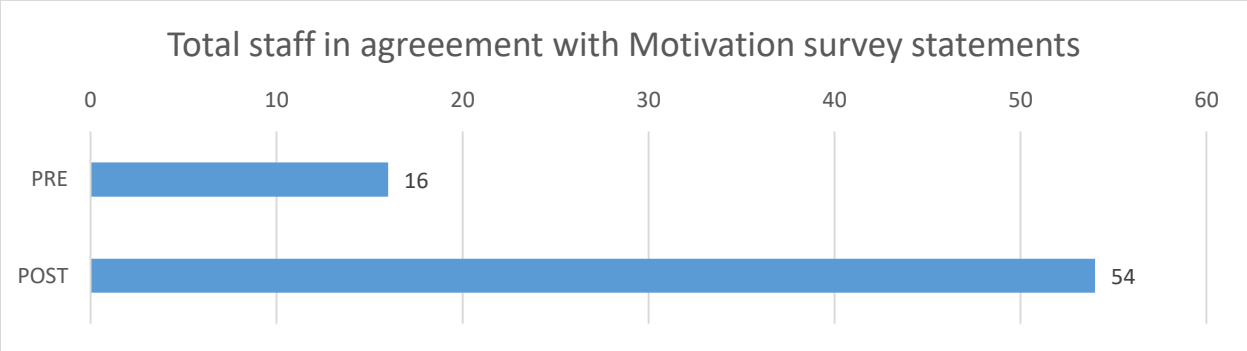
Research question 3: What recommendations can be made to integrate instructional material via the use of a VLEs?

Although not directly evidenced by the data, the findings of integrating instructional material via the use of VLES resulted in the following recommendations: use frequent, direct and personalised feedback; if available, use extrinsic motivators to encourage students to invest more effort; capitalise on the ease of implementation and management of collaborative tasks through associated productive functions or apps; use the persistent and easily retrievable archive of work and feedback in support of parent teacher conferences and report writing; build in opportunities for clear and purposeful student - student and class - teacher interaction that can be observed and celebrated by parents and other staff; research and make use of reusable, easy to implement Summative and formative tools to reduce workload and increase consistency among classes; utilise cloud storage facilities for ease of distribution of electronic resources, rubrics and scaffolding tools; share and discuss these features with student and co-workers to share best practice and establish baselines of usage.

Hypothesis $H1_0$ There are a no significant differences between the pre and post-test scores for motivation (self-efficacy and intrinsic value) and gamification via technology.]

Based on the analysis of the survey data completed by staff in observation of their students, $H1_0$ is refuted. As it can be seen from figure 14, derived from the staff survey questions 1 – 4, there was a large increase in the number of class teachers that indicate agreement after the implementation of gamification.

Figure 14. Total numbers of staff in agreement with Motivation statements

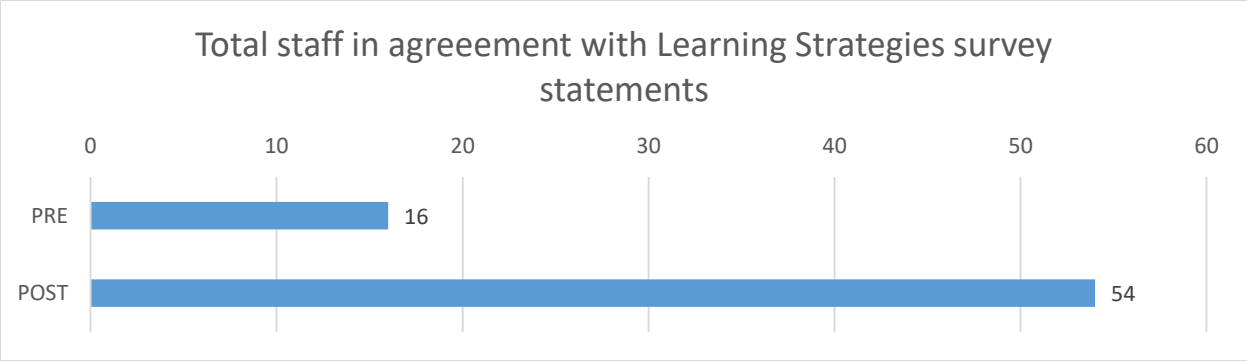


This is reflective of the greater value students generally place on the need for their devices to be present and ready to use in order to enjoy gamified content. Research by Ryan et al. (2006) discusses how this increase in autonomy and competence can be explained by the theory of Self-Determination (Ryan & Deci, 2000) and how video games, or game-based elements motivate and can meet the psychological needs of players thus, motivating them to delve deeper into the content offered (liu et al., 2017).

Hypothesis $H2_0$ There are no significant differences between the pre and post-test scores for learning strategies (cognitive and self-regulation) and gamification via technology.

The implementation of gamified rewards and access to voluntary self-help tutorials for BYOD related technical problem had an observable impact on student cognition and self-regulation and thus $H2_0$ is also refuted. As can be seen in figure 15, drawn from staff survey statements 5 - 8, there is a major increase in agreement from staff that their students are more prepared and independent in problem solving BYOD related issues.

Figure 15. Total numbers of staff in agreement with Learning Strategy statements

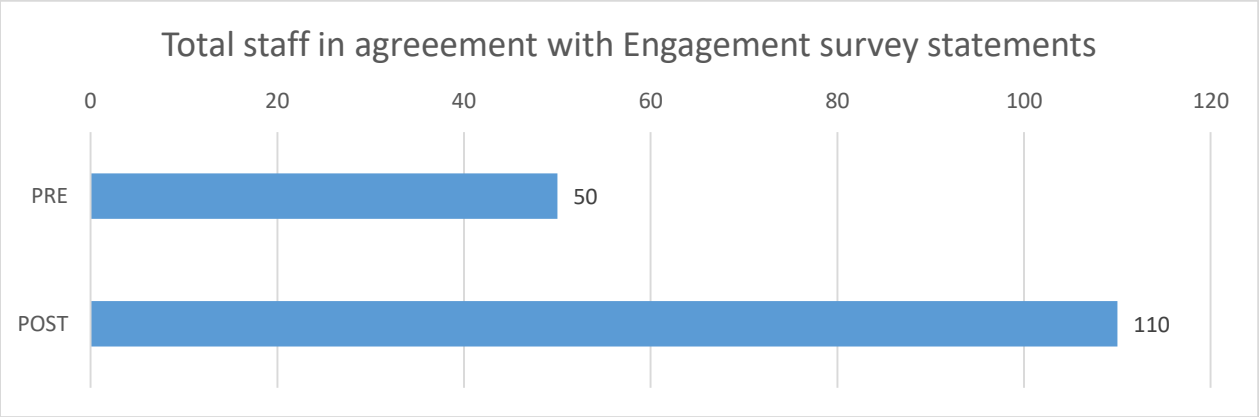


This empowerment of students and celebration of success via technology is becoming widespread and has seen many benefits, including essential 21st competencies as discussed by Thomas (2016) and Harrold (2015) where it is made clear that once an online course is gamified, students willingly accessed and learnt from digital material without the need for sustained adult direction and demonstrated high levels of autonomy, in comparison to non-gamified classes.

Hypothesis $H3_0$ There are no significant differences between the pre and post-test scores for engagement (behavioural, emotional and cognitive) and gamification via technology.

From the data presented in Figure 16, $H3_0$ must also be refuted. The large increase in the number of staff that agreed with the survey statements 9 – 16 after implementing the use of BYOD to access gamified learning activities, shows a general rise in how much effort and time the student invest into to tasks using their devices. Engagement, as described in chapter 1 relates to the willing and meaningful participation in an activity and it must be concluded that this rise was only possible due to the change in independence, personal responsibility and problem-solving skills displayed by students once they were motivated to do so.

Figure 16. Total numbers of staff in agreement with Engagement statements



Jen-Wei & Hung-Yu (2016) state that rise in engagement relating to gamification is due to the mechanics of games themselves and game-based elements that can be implemented via learning activities. Particularly the use of redeemable points, digital currencies and virtual goods. All of these were experienced by the participants of this study via the use of Classcraft and instantly realised and interacted with via their iPads.

4.6 Summary

In this chapter, there was a discussion of the findings from both data sets gathered from staff and students, and its relation to both the research questions and the hypotheses. In the following chapter the recommendations and future implications will be presented.

Chapter 5: Conclusions and Recommendations

5.0 Introduction

In this chapter, the overall findings from this research will be summarised, its relation to the literature and best practices in the classroom. Included also are the recommendations on how to implement gamification platforms, effective use of BYOD and implications for the future.

5.1 Discussion of the Findings and Relation to the Literature

Gamification as a motivational tool and platform for online delivery of learning activities and resources is a critical element of integrating technology into schools. But the current shift in many contemporary classrooms, from a teacher previously delivering content to that of 'helping students master the process of learning and discover and master new content knowledge themselves' (Fullan et al. 2014:34) is not a straightforward process. It is achieved by offering instructional content online, accessible at any time and in a manner suitable to individual students, is one of the benefits of high quality digital learning resources. The observable increase in students' independence and autonomy as evidenced in Chapter 4, agrees with the work by Becker et al. (2016) that increased prosocial behaviours and 21st Century Learning skills are becoming present at an early age via motivation with a gamified platform and more productive use of BYOD and other technological tools.

The results of this research find that a very effective means of extracting the greatest potential from BYOD and younger students is to use gamification to create a learning environment that is engaging, enriching, relevant and fun. This is by no means a simple task and requires several aspects to be successful; Information systems research to ground design in theories of human motivation and behaviour (Liu et al., 2017; Instructional Designers (ID) to smoothly integrate technologies both existing and emergent (Glanatov, 2012); and sound pedagogy as well as collaboration and the sharing of best practice between educators (Thomas, 2106). Additionally, the student data led to the conclusion that for students who are already engaged independently in their work and possessive of good cognitive strategies in relation to their academic work and achievements, gamification may have no additional impacts as they are already consistently motivated intrinsically, for whatever reason, to perform well in primary school (Lemos & Verissimo, 2014).

5.2 Recommendations

The following recommendations are made based on the findings:

Motivation (Self-efficacy and Intrinsic value) and Gamification via Technology

New and agile learning environments that transfer the ownership of learning to the students (Becker at al., 2016) are now readily available and can encourage them to be more independent in their seeking of new knowledge and skills. They can foster autonomous development and the use of cognition and self-regulation via intrinsic motivation and rewards (Moldovan, 2014). Incentives should be sought therefore to motivate the students themselves to be voluntarily held accountable for their devices also. One such method could be digital rewards via the use of gamification or game-based learning and the most productive utilisation of technology available, such as BYOD. There is little research on this area currently and was one of the major drivers of this study, however it is an evolving area and as evidenced by Fullan & Langworthy (2014) such high uses of technology can act as enablers and accelerators for core components of new pedagogies. Similar rises in motivation by the use of digital badges, points and leader boards have already been confirmed to work in adult workplace contexts by Oruscu (2014) and the proven methodologies are transferable to educational contexts with the correct pedagogy.

Engagement (Behavioural, Emotional and Cognitive) and Gamification via Technology

Engagement as a measure of a student's willing and meaningful participating in learning tasks can be difficult to quantify, as was found by the inconclusive student data gathered for this study. However, the effect of engagement as a measure of success can be readily identified in test scores, behaviour and meaningful discussion with students and teachers alike. This was seen in the work by Stokes (2014) where post gamification, there were improvements in class attendance, test scores, general language and behaviour in class and demeanour. Additionally, the improvements to student engagement after gamification were also seen to result in more positive learning habits, response to deadlines, accountability and responsibility (Walker, 2015). These improvements, resultant of greater engagement, were all brought about by the inclusion of gamification or game-based learning into learning activities, accessed by the student via technology. The ability to encourage engagement via tailored content has been discussed at length by Pritchard (2005), gamification and the use technology is just a realisation of this with new tools that are more relevant to today's students and this study concludes that it is both viable and worthwhile.

Learning Strategies (Cognitive and Self-regulation) and Gamification via Technology

The use of gamification or game-based elements in any learning activity is highly recommended as it is well-received by learners of varying age groups (Buckley & Doyle, 2017), but especially when used in combination with technology and the attractive and motivational aspects present in video game mechanics (Ryan et al, 2006). When combined effectively and interconnected via the Internet, one can create a culture of new and readily embraced learning partnerships between teachers and learners that embraces new pedagogies and fosters deep learning (Fullan & Langworthy, 2014).

5.3 Future Implications

Okoji et al. (2006) state that one of the major factors affecting effective technology integration is that the pedagogical principles guiding its use have not been addressed. If a method of technology integration and lesson delivery utilising gamification and digital rewards can be shown to have positive effects on students' motivation and engagement, then it has validity and can be used by other practitioners to increase the impact of their own educational practices with technology in similar circumstances. More specifically, as stated by Dichev & Dicheva (2017:26), 'continued theoretical and rigorous systemic empirical work in varying gamification settings and across contexts will enable us to establish a practical, comprehensive and methodical understanding of the benefits of applying gamification in educational contexts'.

If similar research is conducted, the processes used in this study should be implemented at the beginning of the academic year and across an entire year group or phase with every teacher participating. It is also advised that the data collection process is non-voluntary and embedded into curriculum objectives, perhaps via the use of formative assessments, online analytics or student reflections to better validate any impact.

References

Abdul Jabbar, A, & Felicia, P 2015, 'Gameplay Engagement and Learning in Game-Based Learning', *Review Of Educational Research*, 85, 4, p. 740, Complementary Index, EBSCO*host*, viewed 12 August 2018.

Ackerman, A, & Krupp, M 2012, 'FIVE COMPONENTS TO CONSIDER FOR BYOT/BYOD', *Proceedings Of The IADIS International Conference On Cognition & Exploratory Learning In Digital Age*, pp. 35-41, Education Research Complete, EBSCO*host*, viewed 12 August 2018.

Adachi, P, & Willoughby, T 2013, 'Do Video Games Promote Positive Youth Development?', *Journal Of Adolescent Research*, 28, 2, pp. 155-165, Education Research Complete, EBSCO*host*, viewed 12 August 2018.

Akers, R 2017, 'a journey to increase student engagement', *Technology & Engineering Teacher*, 76, 5, pp. 28-32, Education Research Complete, EBSCO*host*, viewed 23 July 2018.

Alan Bryman, a 1984, 'The Debate about Quantitative and Qualitative Research: A Question of Method or Epistemology?', *The British Journal Of Sociology*, 1, p. 75, JSTOR Journals, EBSCO*host*, viewed 6 June 2018.

AppleInsider. (2018). *Free to download Fortnite generates $100M in 90 days via in-app purchases*. [online] Available at: https://appleinsider.com/articles/18/06/21/free-to-download-fortnite-generates-100m-in-90-days-via-in-app-purchases [Accessed 23 Jul. 2018].

Appleton, J, Christenson, S, & Furlong, M 2008, 'Student engagement with school: Critical conceptual and methodological issues of the construct', *Psychology In The Schools*, 45, 5, pp. 369-386, Academic Search Premier, EBSCO*host*, viewed 23 July 2018.

Banfield, J, & Wilkerson, B 2014, 'Increasing Student Intrinsic Motivation and Self-Efficacy through Gamification Pedagogy', *Contemporary Issues In Education Research*, 7, 4, pp. 291-298, ERIC, EBSCO*host*, viewed 14 March 2018.

Bear, G, Slaughter, J, Mantz, L, & Farley-Ripple, E 2017, 'Research paper: Rewards, praise, and punitive consequences: Relations with intrinsic and extrinsic motivation', *Teaching And Teacher Education*, 65, pp. 10-20, Science Direct, EBSCO*host*, viewed 13 March 2018.

Becker, S.A., Freeman, A., Hall, C.G., Cummins, M. & Yuhnke, B., 2016. *NMC/CoSN horizon report: 2016 K*-12 Edition. Austin,Texas: The New Media Consortium.

Boekaerts, M., Pintrich, P. & Zeidner, M. (2000). *Handbook of Self-regulation*. London: Academic Press.

Brühlmann, F., 2016. ‘Gamification from the perspective of self-determination theory and flow.’, *Thesis Commons,* available at:https://doi.org/10.31237/osf.io/6kauv, viewed 25 May 2018.

Buckley, P, Doyle, E, & Doyle, S 2017, 'Game On! Students' Perceptions of Gamified Learning', *Journal Of Educational Technology & Society*, 20, 3, pp. 1-10, Academic Search Premier, EBSCO*host*, viewed 12 August 2018.

Çakıroğlu, Ü, Başıbüyük, B, Güler, M, Atabay, M, & Yılmaz Memiş, B 2017, 'Gamifying an ICT course: Influences on engagement and academic performance', *Computers In Human Behavior*, 69, pp. 98-107, ScienceDirect, EBSCO*host*, viewed 23 July 2018.

Charles W., F, David C., B, Nikola N., F, Richard, M, Leonard S., C, & Marilyn M., D 1981, 'teaching behaviors, academic learning time, and student achievement: an overview', *The Journal Of Classroom Interaction*, 1, p. 2, JSTOR Journals, EBSCO*host*, viewed 12 August 2018.

Chan, T.W., Roschelle, J., Hsi, S., Kinshuk, Sharples, M., Brown, T., Patton, C., Cherniavsky, J., PEA, R., Norris, C. & Soloway, E., 2006. 'One-to-one technology-enhanced learning: An opportunity for global research collaboration'. *Research and Practice in Technology Enhanced Learning*, *1*(01), pp.3-29, EBSCO*host*, viewed 10 May 2018.

Chou, P.N., Chang, C.C. & Lin, C.H., 2017. BYOD or not: 'A comparison of two assessment strategies for student learning'. *Computers in Human Behavior*, *74*, pp.63-71, EBSCO*host*, viewed 10 May 2018.

Christenson, S.L., Reschly, A.L. & Wylie, C. eds., 2012. *Handbook of research on student engagement*. Springer Science & Business Media.

Clark, W. & Luckin, R., 2013. 'iPads in the Classroom. What The Research Says'. *Institute of Education University of London,* [online] available at. Viewed 10 May 2018

Carmichael, S. (2017). *4 most effective classroom management strategies (Part 1) - Classcraft Blog*. [online] Available at: https://www.classcraft.com/blog/research/classroom-management-strategies-1/ [Accessed 30 Jul. 2018].

Carmichael, S. (2016). *7 ways video games fulfill student needs in education - Classcraft Blog*. [online] Available at: https://www.classcraft.com/blog/features/g4c-features/7-ways-video-games-fulfill-student-needs-in-education/ [Accessed 30 Jul. 2018].

Classcraft. (2018). *Classcraft - Gamification in Education*. [online] Available at: https://www.classcraft.com/gamification [Accessed 3 Aug. 2018].

Corno, L, & Mandinach, E 1983, 'The Role of Cognitive Engagement in Classroom Learning and Motivation', *Educational Psychologist*, 18, 2, p. 88, Complementary Index, EBSCO*host*, viewed 12 August 2018.

Credé, M, & Phillips, L 2011, 'A meta-analytic review of the Motivated Strategies for Learning Questionnaire', *Learning and Individual Differences*, 21, pp. 337-346, ScienceDirect, EBSCO*host*, viewed 14 March 2018.

Creswell, J, Hanson, W, Plano Clark, V, & Morales, A 2007, 'Qualitative Research Designs: Selection and Implementation', *Counseling Psychologist*, 35, 2, pp. 236-264, ERIC, EBSCO*host*, viewed 1 June 2018.

Creswell, J, Shope, R, Plano, V, Green, C, & Green, D 2006, 'How Interpretive Qualitative Research Extends Mixed Methods Research', *Research InThe Schools*, 13, 1, pp. 1-11, Education Research Complete, EBSCO*host*, viewed 1 June 2018.

Creswell, J.W., 1994. *Research design: Qualitative & quantitative approaches*. London: SAGE Publications, Ltd., SAGE Research Methods, EBSCO*host*, viewed 12 August 2018.

Creswell, J.W., 2002. *Educational research: Planning, conducting, and evaluating quantitative*, Upper Saddle River, NJ: Prentice Hall.

Cristol, D. & Gimbert, B., 2013. Academic achievement in BYOD classrooms. *QScience Proceedings*, (12th World Conference on Mobile and Contextual Learning [mLearn 2013), p.15.

Dana, N.F., 2013. *Digging deeper into action research: A teacher inquirer's field guide*. California: Corwin Press.

Darejeh, A, & Salim, S 2016, 'Gamification Solutions to Enhance Software User Engagement—A Systematic Review', *International Journal Of Human-Computer Interaction*, 32, 8, p. 613, Complementary Index, EBSCO*host*, viewed 12 August 2018.

Davis, H.A., Summers, J.J. & Miller, L.M., 2012. *An interpersonal approach to classroom management: Strategies for improving student engagement*. California: Corwin Press.

Deci, E, & Ryan, R 1985, 'General Causality Orientations Scale', *Psyctests*, PsycTESTS, EBSCO*host*, viewed 11 October 2017.

Delgado, A, Wardlow, L, McKnight, K, & O'Malley, K 2015, 'Educational Technology: A Review of the Integration, Resources, and Effectiveness of Technology in K-12 Classrooms', *Journal Of Information Technology Education: Research*, 14, pp. 397-416, ERIC, EBSCO*host*, viewed 5 August 2018.

Department For Education (2016). *Education Technology Action Group Our Reflections*. Available at: http://www.heppell.net/etag/media/ETAG_reflections.pdf Accessed: 30/8/2017

Dichev, C, & Dicheva, D 2017, 'Gamifying education: what is known, what is believed and what remains uncertain: a critical review', *International Journal Of Educational Technology In Higher Education*, 14, 1, pp. 1-36, Education Research Complete, EBSCO*host*, viewed 11 October 2017.

Dillenbourg, P., Schneider, D. & Synteta, P., 2002. Virtual learning environments. In *3rd Hellenic Conference" Information & Communication Technologies in Education"* (pp. 3-18). Kastaniotis Editions, Greece.

Emerson, RW 2015, 'Convenience Sampling, Random Sampling, and Snowball Sampling: How Does Sampling Affect the Validity of Research?', *Journal Of Visual Impairment & Blindness*, 109, 2, pp. 164-168, Education Research Complete, EBSCO*host*, viewed 27 June 2018.

Etikan, I., Musa, S.A. and Alkassim, R.S., 2016. Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), pp.1-4, viewed 22 June 2018.

Faiella, F, & Ricciardi, M 2015, 'gamification and learning: a review of issues and research', *Journal Of E-Learning & Knowledge Society*, 11, 3, pp. 13-21, Education Research Complete, EBSCO*host*, viewed 10 October 2017.

Ferguson, RB 2012, 'Reality Is Broken by J. McGonigal', *Games For Health Journal*, 1, 1, pp. 77-78, MEDLINE, EBSCO*host*, viewed 5 August 2018.

Fernández-Díaz, E, Fernández-Olaskoaga, L, & Gutiérrez-Esteban, P 2017, 'Collaborative action research through technologically mediated agoras', *Educational Action Research*, 25, 1, pp. 56-70, Education Research Complete, EBSCO*host*, viewed 3 August 2018.

Fredericks, J.A., Blumenfeld, P., Friedel, J., & Paris, A. (2005). School engagement. In K.A. Moore & L. Lippman (Eds.), *What do children need to flourish?: Conceptualizing and measuring indicators of positive development.* New York, NY: Springer Science and Business Media.

Fullan, M., Langworthy, M. & Barber, M., 2014. A rich seam. *How New Pedagogies Find Deep Learning.* [Online] Available at: *http://npdl.thumbtack.co.nz/wpcontent/uploads/2015/08/A-Rich-Seam.pdf*, viewed 12 June 2018.

Gl-assessment.co.uk. (2018). *GL Assessment | GL Education*. [online] Available at: https://www.gl-assessment.co.uk/ [Accessed 3 Aug. 2018].

Glazatov, TR 2012, 'Applying Instructional Design System Theory to Mobile Learning Environments', *Journal Of Applied Learning Technology*, 2, 2, pp. 29-35, Education Research Complete, EBSCO*host*, viewed 12 August 2018.

GOV.UK. (2018). National curriculum. [online] Available at: https://www.gov.uk/government/collections/national-curriculum [Accessed 27 May 2018].

Grant, M, Tamim, S, Brown, D, Sweeney, J, Ferguson, F, & Jones, L 2015, 'Teaching and Learning with Mobile Computing Devices: Case Study in K-12 Classrooms', *Techtrends: Linking Research & Practice To Improve Learning*, 59, 4, pp. 32-45, Education Research Complete, EBSCO*host*, viewed 3 June 2018.

Greaves, T.W., Hayes, J., Wilson, L., Gielniak, M. & Peterson, E.L., 2012. *Revolutionizing education through technology: The project RED roadmap for transformation*. Eugene, OR: International Society for Technology in Education.

Halvorsen, M., 2013. *The use of gamification in learning applications*. Master's thesis. The University of Bergen. Available at: http://bora.uib.no/handle/1956/7615, viewed 15 May 2018.

Hanus, M, & Fox, J 2015, 'Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance', *Computers & Education*, 80, pp. 152-161, ScienceDirect, EBSCO*host*, viewed 11 October 2017.

Harrold, D. J. (2015). *Game on: A qualitative case study on the effects of gamified curriculum design on student motivational learning habits* (Order No. 3691842). Available from ProQuest Central. (1673159776).

Hedberg, E, & Ayers, S 2015, 'The power of a paired t-test with a covariate', *Social Science Research*, 50, pp. 277-291, PsycINFO, EBSCO*host*, viewed 11 August 2018.

Henrie, C, Halverson, L, & Graham, C 2015, 'Measuring student engagement in technology-mediated learning: A review', *Computers & Education*, 90, pp. 36-53, ScienceDirect, EBSCO*host*, viewed 12 August 2018.

Hew, K, & Brush, T 2007, 'Integrating technology into K-12 teaching and learning: current knowledge gaps and recommendations for future research', *Educational Technology Research & Development*, 55, 3, pp. 223-252, Academic Search Premier, EBSCO*host*, viewed 12 August 2018.

Hockly, Nicky. "Tech-savvy teaching: BYOD." *Modern English Teacher* 21, no. 4 (2012): 44-45. [Online] Available at: https://s3.amazonaws.com/academia.edu.documents/29698916/Hockly_MET-21.4.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1534081047&Signature=T9AWG7ZWk7R0Vr%2BW1h%2FZk0O%2F87Q%3D&response-content-disposition=inline%3B%20filename%3DTech-savvy_teaching_BYOD.pdf, viewed 12 June 2018

Hopkins, N., Sylvester, A. & Tate, M., 2013. 'Motivations for BYOD: An investigation of the contents of the 21st century school bag'. In *Proceedings of the 21st European Conference on Information Systems (ECIS 2013)* (pp. Number-183). AIS Electronic Library (AISeL). Viewed 10 June 2018

Hsin-Chung, C, & Stotlar, D 2012, 'An Examination of the Motivation and Satisfaction of College Students Enrolled in Physical Education Courses', *Sport Science Review*, 21, 1/2, pp. 43-63, SPORTDiscus with Full Text, EBSCO*host*, viewed 15 March 2018.

Influences on engagement and academic performance', *Computers In Human Behavior*, 69, pp. 98-107, ScienceDirect, EBSCO*host*, viewed 23 July 2018.

Jen-Wei, C, & Hung-Yu, W 2016, 'Exploring Engaging Gamification Mechanics in Massive Online Open Courses', *Journal Of Educational Technology & Society*, 19, 2, pp. 177-203, Education Research Complete, EBSCO*host*, viewed 12 August 2018.

John Chi-Kin, L, Zhonghua, Z, & Hongbiao, Y 2010, 'Using multidimensional Rasch analysis to validate the Chinese version of the Motivated Strategies for Learning Questionnaire (MSLQ-CV)', *European Journal Of Psychology Of Education*, 1, p. 141, JSTOR Journals, EBSCO*host*, viewed 14 March 2018.

John W. Creswell, & Dana L. Miller, a 2000, 'Determining Validity in Qualitative Inquiry', *Theory Into Practice*, 3, p. 124, JSTOR Journals, EBSCO*host*, viewed 1 June 2018.

Karadeniz, S, Buyukozturk, S, Akgun, O, Cakmak, E, & Demirel, F 2008, 'The Turkish Adaptation Study of Motivated Strategies for Learning Questionnaire (MSLQ) for 12-18 Year Old Children: Results of Confirmatory Factor Analysis', *Online Submission*, ERIC, EBSCO*host*, viewed 15 March 2018.

Khda.gov.ae. (2018). Home | Knowledge and Human Development Authority. [online] Available at: https://www.khda.gov.ae/en/ [Accessed 27 May 2018].

Kings Schools Group Dubai. (2018). Welcome to kings' school al barsha - Kings Schools Group Dubai. [online] Available at: http://kings-edu.com/kings-school-al-barsha/ [Accessed 27 May 2018].

Kivunja, C, & Kuyini, A 2017, 'Understanding and Applying Research Paradigms in Educational Contexts', *International Journal Of Higher Education*, 6, 5, pp. 26-41, ERIC, EBSCO*host*, viewed 27 May 2018.

Langdridge, D. & Hagger-Johnson, G., 2009. *Introduction to research methods and data analysis in psychology*. Pearson Education.

Lemos, M, & Veríssimo, L 2014, 'The Relationships between Intrinsic Motivation, Extrinsic Motivation, and Achievement, Along Elementary School', *Procedia - Social And Behavioral Sciences*, 112, International Conference on Education & Educational Psychology 2013 (ICEEPSY 2013), pp. 930-938, ScienceDirect, EBSCO*host*, viewed 5 June 2018.

Liu, D, Santhanam, R, & Webster, J 2017, 'TOWARD MEANINGFUL ENGAGEMENT: A FRAMEWORK FOR DESIGN AND RESEARCH OF GAMIFIED INFORMATION SYSTEMS', *MIS Quarterly*, 41, 4, pp. 1011-1-A4, Business Source Premier, EBSCO*host*, viewed 5 August 2018.

Looyestyn, J, Kernot, J, Boshoff, K, Ryan, J, Edney, S, & Maher, C 2017, 'Does gamification increase engagement with online programs? A systematic review', *Plos ONE*, 12, 3, pp. 1-19, Academic Search Premier, EBSCO*host*, viewed 18 September 2017.

Mabel CPO, O, Anthony A., O, & Tinukwa C., O 2006, 'The Pedagogy of Technology Integration', *The Journal Of Technology Studies*, 1/2, p. 66, JSTOR Journals, EBSCO*host*, viewed 12 August 2018.

Majgaard, G, Misfeldt, M, & Nielsen, J 2011, 'How design-based research and action research contribute to the development of a new design for learning', *Designs For Learning*, 4, 2, pp. 8-27, Education Research Complete, EBSCO*host*, viewed 11 August 2018.

Manwaring, K.C., Larsen, R., Graham, C.R., Henrie, C.R. & Halverson, L.R., 2017. Investigating student engagement in blended learning settings using experience sampling and structural equation modeling. *The Internet and Higher Education*, *35*, pp.21-33.

Marcovitz, D., 2012. *Digital connections in the classroom*. Oregon: International Society for Technology in Education.

Mekler, E, Brühlmann, F, Tuch, A, & Opwis, K 2017, 'Towards understanding the effects of individual gamification elements on intrinsic motivation and performance', *Computers In Human Behavior*, 71, pp. 525-534, PsycINFO, EBSCO*host*, viewed 11 March 2018.

Mills, GE 2000, *Action Research: A Guide For The Teacher Researcher*, n.p.: ERIC, EBSCO*host*, viewed 24 July 2018.

Moldovan, od 2014, 'intrinsic and extrinsic motivation to primary school children', *Journal Plus Education / Educatia Plus*, 10, 1, pp. 203-211, Education Research Complete, EBSCO*host*, viewed 13 March 2018.

Mosher, R, & MacGowan, B 1985, 'Assessing Student Engagement in Secondary Schools: Alternative Conceptions, Strategies of Assessing, and Instruments', ERIC, EBSCO*host*, viewed 23 July 2018.

Mousoulides, N. & Philippou, G., 2005, July. Students' motivational beliefs, self-regulation strategies and mathematics achievement. In *Proceedings of the 29th Conference of the International Group for the Psychology of Mathematics Education* (Vol. 3, pp. 321-328). PME.

Nausheen, M 2016, 'An Adaptation of the Motivated Strategies for Learning Questionnaire (MSLQ) for Postgraduate Students in Pakistan: Results of an Exploratory Factor Analysis', *Bulletin Of Education & Research*, 38, 1, pp. 1-16, Education Research Complete, EBSCO*host*, viewed 14 March 2018.

Office of Educational Technology (2016). *Future Ready Learning, Reimagining the role of Technology in Education*. Washington D.C.: U.S. Department of Education.

Okojie, M, Olinzock, A, & Okojie-Boulder, T 2006, 'The Pedagogy of Technology Integration', *Journal Of Technology Studies*, 32, 2, pp. 66-71, Academic Search Premier, EBSCO*host*, viewed 12 August 2018.

Orosco, J.S., 2014. *Examination of Gamification: Understanding Performance as it Relates to Motivation and Engagement* (Doctoral dissertation, Colorado Technical University).

Paul R., P, Ronald W., M, & Robert A., B 1993, 'Beyond Cold Conceptual Change: The Role of Motivational Beliefs and Classroom Contextual Factors in the Process of Conceptual Change', *Review Of Educational Research*, 2, p. 167, JSTOR Journals, EBSCO*host*, viewed 23 July 2018.

Perry, D, & Steck, A 2015, 'Increasing Student Engagement, Self-Efficacy, and Meta-Cognitive Self-Regulation in the High School Geometry Classroom: Do iPads Help?', *Computers In The Schools*, 32, 2, pp. 122-143, Education Research Complete, EBSCO*host*, viewed 11 March 2018.

Pintrich, P, & de Groot, E 1990, 'Motivational and self-regulated learning components of classroom academic performance', *Journal of Educational Psychology*, 82, 1, pp. 33-40, PsycARTICLES, EBSCO*host*, viewed 14 March 2018.

Pintrich, P, Smith, D, Garcia, T, & McKeachie, W 1993, 'Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ)', *Educational And Psychological Measurement*, 53, 3, pp. 801-813, PsycINFO, EBSCO*host*, viewed 14 March 2018.

Pintrich, P. R., & De Groot, E. V. (1990). Motivated Strategies for Learning Questionnaire [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t09161-000

Pintrich, P.R. & Schrauben, B., 1992. Students' motivational beliefs and their cognitive engagement in classroom academic tasks. *Student perceptions in the classroom*, *7*, pp.149-183.

Pritchard, A 2005, *Ways Of Learning: Learning Theories And Learning Styles In The Classroom*, n.p.: David Fulton Publishers, ERIC, EBSCO*host*, viewed 12 August 2018.

Punch, K. F., 2009, Introduction to Research Methods in Education*, London: Sage*

Rienties, B, Tempelaar, D, Van den Bossche, P, Gijselaers, W, & Segers, M 2009, 'The role of academic motivation in Computer-Supported Collaborative Learning', *Computers In Human Behavior*, 25, pp. 1195-1206, ScienceDirect, EBSCO*host*, viewed 5 June 2018.

Rosenberg, J, & Koehler, M 2015, 'Context and Technological Pedagogical Content Knowledge (TPACK): A Systematic Review', *Journal Of Research On Technology In Education*, 47, 3, pp. 186-210, ERIC, EBSCO*host*, viewed 5 August 2018.

Ryan, R, Rigby, C, & Przybylski, A 2006, 'The Motivational Pull of Video Games: A Self-Determination Theory Approach', *Motivation & Emotion*, 30, 4, pp. 344-360, Academic Search Premier, EBSCO*host*, viewed 23 July 2018.

Ryan, R, & Deci, E 2000, 'Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions', *Contemporary Educational Psychology*, 25, 1, pp. 54-67, Education Research Complete, EBSCO*host*, viewed 12 August 2018.

Sagor, R, & Association for Supervision and Curriculum Development, A 1992, 'How To Conduct Collaborative Action Research', ERIC, EBSCO*host*, viewed 3 August 2018.

Sailer, M., Hense, J.U., Mayr, S.K. & Mandl, H., 2017. How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior*, *69*, pp.371-380.

Schunk, D.H., 2005. Self-regulated learning: The educational legacy of Paul R. Pintrich. *Educational psychologist*, *40*(2), pp.85-94.

Simões, J, Redondo, R, & Vilas, A 2013, 'A social gamification framework for a K-6 learning platform', *Computers In Human Behavior*, 29, 2, pp. 345-353, Education Research Complete, EBSCO*host*, viewed 3 June 2018.

Sinatra, G, Heddy, B, & Lombardi, D 2015, 'The Challenges of Defining and Measuring Student Engagement in Science', *Educational Psychologist*, 50, 1, pp. 1-13, Education Research Complete, EBSCO*host*, viewed 23 July 2018.

Skinner, E.A. & Belmont, M.J., 1993. Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of educational psychology*, *85*(4), p.571.

Stokes, Z., 2014. *Integration of gamification into the classroom and the reception by students*. Marshal University. Available at: http://mds.marshall.edu/etd/856. Accessed 10 August 2018.

Swann, W 2013, 'The Impact of Applied Cognitive Learning Theory on Engagement with eLearning Courseware', *Journal Of Learning Design*, 6, 1, pp. 61-74, ERIC, EBSCO*host*, viewed 12 August 2018.

Tomaso, P., 2014. *A quantitative assessment of the effect of games on learning* (Doctoral dissertation, Colorado Technical University).

Ulum, ÖG 2016, 'Epistemology in Qualitative Educational Research: A Review of Published Articles', *Online Submission*, 7, pp. 19-28, ERIC, EBSCO*host*, viewed 27 May 2018.

Thomas, S., 2016. Future Ready Learning: Reimagining the Role of Technology in Education. 2016 National Education Technology Plan. *Office of Educational Technology, US Department of Education*.

Valtonen, T, Sointu, E, Kukkonen, J, Kontkanen, S, Lambert, M, & Mäkitalo-Siegl, K 2017, 'TPACK updated to measure pre-service teachers' twenty-first century skills', *Australasian Journal Of Educational Technology*, 33, 3, pp. 15-31, Education Research Complete, EBSCO*host*, viewed 23 July 2018.

Viorica-Torii, C, & Carmen, A 2013, 'The Impact of Educational Technology on the Learning Styles of Students', *Procedia - Social And Behavioral Sciences*, 83, 2nd World Conference on Educational Technology Research, pp. 851-855, ScienceDirect, EBSCO*host*, viewed 18 September 2017.

Walker, C, Greene, B, & Mansell, R 2006, 'Identification with academics, intrinsic/extrinsic motivation, and self-efficacy as predictors of cognitive engagement', *Learning And Individual Differences*, 16, pp. 1-12, ScienceDirect, EBSCO*host*, viewed 5 June 2018.

Yarbro, J, McKnight, K, Elliott, S, Kurz, A, & Wardlow, L 2016, 'Digital Instructional Strategies and Their Role in Classroom Learning', *Journal Of Research On Technology In Education*, 48, 4, pp. 274-289, Business Source Premier, EBSCO*host*, viewed 12 August 2018.

Yilmaz, K 2013, 'Comparison of Quantitative and Qualitative Research Traditions: Epistemological, Theoretical, and Methodological Differences', *European Journal Of Education*, 48, 2, pp. 311-325, ERIC, EBSCO*host*, viewed 27 May 2018.

Appendices

Appendix A: Ethical Approval Form

PLEASE NOTE: After approval is given, if there are any subsequent modifications to the study once it is underway a further Ethics Response Form and re-approval will be required

Researcher (student): Habeeb Mustafa	**Faculty reviewer: Ernest Ampadu**	**Date of Review:22nd Jan 2018**
Working title of Proposal or summary of study scope: *Can gamification or Game Based Learning via BYOD increase active engagement in learning activities for students age 8 - 11 years?*		
Proposal attached? ___ Yes _X__No	**Supplementary documentation attached (inc Module 7 Faculty Checklist)? ___Yes ___ No**	

Each of the ethical standards below must be adequately addressed by the researcher in order to obtain ethics approval.

In the blue column, the RESEARCHER (student) should perform a self-check using these 35 questions before submitting the ethics form to the faculty member supervising the study. In each row of the blue column, the RESEARCHER should enter YES, NO, or NA as well as a very brief explanation. The Academic Honesty Declaration must be attached and should be signed and dated.

In the yellow column the ETHICS REVIEWER (Research Proposal faculty member) will enter YES, NO, or NA to confirm or challenge the RESEARCHER'S self-check on each standard. With each NO, the ETHICS REVIEWER will indicate what revisions are required for ethics approval. The faculty reviewer will also render a decision at the end of this form and return the form to the RESEARCHER.

If the ETHICS REVIEWER (Research Proposal faculty member) is able to approve "as is" then the orange column is left blank.

In the orange column, the RESEARCHER (student) will respond to each of the ETHICS REVIEWER'S concerns to explain where/how each of the reviewer's concerns was met in the resubmitted materials.

	Researcher's ethics self-check In each row, the researcher should confirm compliance with the ethical standard by entering "Yes," "No," or "N/A," along with a brief defence of the response (i.e., stating keywords that point to how the ethical standard has been met).	Ethics Reviewer's assessment: After the researcher has presented the evidence for compliance with each ethical standard, the Ethics Reviewer should either confirm by entering "Yes" or challenge with "No." With each "No," the reviewer must specify what revisions are needed to obtain ethics approval.	Researcher's response to Ethics Reviewer Researcher must use this column to explain how and where each of the Ethics Reviewer's concerns (in the yellow column) has been addressed.
Example: Will data be stored securely?	*Yes. Data files will be kept on a password protected computer.*	*No. Please also address how the paper surveys will be secured prior to being entered as electronic files.*	*Paper surveys will be in a locked file cabinet. Proposal has been updated.*
The first 11 questions apply to all studies (even when the researcher is not interacting with participants to collect new data). **Hover the mouse over the blue footnoted words to view information and definitions.**			
1. Are participant recruitment and data collection steps[i] adequately described, such that the study's risks and burdens can be discerned?	**Yes – Participants will be staff and students at researches workplace. Data will be collected on a purely voluntary basis and shall be designed not to impact or contravene any academic work. Findings will be made available**	**YES**	

	electronically to the participants after conclusion of the study and analysis		
2. Will the research procedures ensure privacy[ii] during data collection?	Yes – data collection will be done predominantly via online survey and VLE analytics. Where there is a requirement for interviews or personal interaction in direct relation with the research shall be private and an additional unbiased and approved adult (the class teacher) will always be in presence	YES	
3. Will data be stored securely[iii] with adequate provisions to maintain the confidentiality of the data?	Yes – All data will be stored within the schools secure network and any sensitive data gathered would also be available to any party within the network via other means to those that have the required level of access. I.e. School databases and medical records	YES	
4. Will the data be stored for at least 5 years?	Yes- the School maintains its records for 5 years in accordance with local law and any additional data shall be archived and placed in safe and secure storage within the school network	YES	
5. If participants' names or contact info will be recorded in the research records, are they absolutely necessary[iv]?	N/A Participants will only be identified in the research by a unique identifying number.	YES	
6. Do the research procedures and analysis/write-up plans include all possible measures to ensure that participant identities are not directly or indirectly[v] disclosed? For secondary data analyses, the proposal must clearly state when/how de-identification will occur.	Yes – Although preliminary data will indicate an identifier that coincided with the student enrolment number within the school database, once the data has been gathered and compiled into a suitable database, de-identification will occur as that phase of the research is concluded. For publication – there shall be no record of the participants identity presented.	YESS	
7. Have all potential psychological[vi], relationship[vii], legal[viii], economic/professional[ix], physical[x], and other risks been fully	Yes – Participants will not be exposed to any content, persons or experiences that they would not otherwise be party to during their daily school life.	YES	

acknowledged[xi] and described?			
8. Have the above risks been minimized [xii]as much as possible?	Yes. The only risk present, that of negative emotional impact with regards to lower gamification rewards is mitigated and ultimately inconsequential – this shall be made clear to participants. The focus is to find motivators for positive engagement and fun.	YES	
9. Has the researcher proactively managed any potential conflicts of interest[xiii]? Note that student researchers may not utilise research assistants to recruit participants or collect research data on behalf of the researcher.	Yes – This research is genuinely of interest to my teaching practice and career a Digital Coach. Thus I am merely analyzing the possible benefits of new methods and tools as I trial them myself to better inform said practice. While conducting the research I shall be providing educational content both via the gamification platforms and with more traditional printouts or PDFs to ensure full coverage of curriculum and learning needs. Participants will be my own students and will be volunteering of free will and without reward.	YES	
10. Are the research risks and burdens[xiv] reasonable, in consideration of the new knowledge[xv] that this research design can offer?	NA –There will be no additional data or time burdens required other that the current timetables amount	YES	
11. If applicable, has the research site provided an Authorisation Letter (or email) granting permission[xvi] for all relevant data[xvii] access, access to participants, facility use, and/or use of personnel time for research purposes?	NA – No sensitive data will be used outside of the research site – data and analysis will be disassociated from any identifiers prior to publishing	YES	
The remaining questions only apply to studies that involve recruiting participants to collect new data (such as surveys, interviews, observations). _____Please place an X on this line if NONE of the questions in the next section are applicable to the proposed study.			

12. Will this researcher be appropriately qualified[xviii] and supervised[xix] in all data collection procedures?	**Yes – The research course has covered all the basic relevant data collection procedures. Additional training will be provided by the Digital Tool Vendors if so required.**	**YES**	
13. Is participant recruitment co-ordinated in a manner that is non-coercive[xx]? Coercive elements include: leveraging an existing relationship to "encourage" participation, recruiting in a group[xxi] setting, extravagant compensation, recruiting individuals in a context of their treatment or evaluation[xxii], etc. A researcher must disclose here whether/how the researcher may already be known to the participants and explain how perceptions of coerced research participation will be minimized[xxiii].	**Yes – the tools and research approach will be introduced in line with lesson delivery, taking but a few minutes and students who are interested may the view additional informative material or a briefing from me in their own time. Those willing to participate shall be doing so of their own free will because they are interested or they find it fun, those that choose not to shall simply use the previously established tools for accessing lesson content and submitting assignments.**	**YES**	
14. If anyone would be excluded from participating, is their exclusion justified? Is their exclusion handled respectfully and without stigma[xxiv]?	**NA – there will be no exclusion from the option to participate.** **Additionally students will be free to join the Digital Platform at any time if they wish, even if they do not consent to their data being used in the study**	**YES**	
15. Where the researcher proposes to use an interpreter, has adequate consideration been given to the interpreter's training regarding confidentiality and principles of informed consent, etc.?	**NA- no interpreter required**	**YES**	

16. Do the informed consent[xxv] procedures provide adequate time to review the study information and ask questions before giving consent?	**YES – there will be at least 5 working days for participants to review the study information with their parents / guardians before giving consent**	**YES**	
17. Will informed consent be appropriately[xxvi] documented?	**Consent will be documented by an online application providing all relevant information signed by the participant and an additional printed sheet with the same, co-signed by the participant and parent / guardian**	**YES**	
18. Is the Participant Information Sheet (PIS) written using language that will be understandable[xxvii] to the potential participants?	**YES – English and Arabic will be provided, where requested additional language translation can also be provided**	**YES**	
19. Does the PIS include an understandable[xxviii] explanation of the research purpose?	**YES – the PIS shall be written in child friendly language and mindful of those for who English is not a first language**	**YES**	
20. Does the PIS explain the sample's inclusion criteria in such a way[xxix] that the participants can understand how/why THEY are being asked to participate?	**YES – The purpose shall be introduce to all students in person via a short presentation in assembly for the how/why. Participation in the study and allowing use of data is then voluntary and documented by informed consent**	**YES**	
21. Does the PIS clearly state that participation is voluntary?	**YES – Although some use of the Digital Tools will be mandatory as used in daily teaching activities, the gamification platform and use of data is voluntary**	**YES**	
22. Does the PIS convey that the participant has the right[xxx] to decline or discontinue participation at any time?	**YES**	**NO** **Explain how**	**YES – "Students will always have the right to withdraw from this research and be assured in writing that there will be no negative outcomes associated with their withdrawal and any data recorded for the**

			research shall be deleted."
23. Does the PIS include an understandable description of the data collection procedures?	**YES**	**NO** **Explain how**	**YES – "Data will be gathered via the use of an online platforms that records the interactions a user has. Such interactions may be content sections that they have completed or questions they have answered. Questionnaires will also be sent to teachers of participating classes to help document any observable impact from this work on other area of BYOD usage."**
24. Does the PIS include an estimate of the time commitment[xxxi] for participation?	**YES – there will be minimal burden on participants for this and no detriment to lesson delivery / academic content**	**YES**	
25. Does the PIS describe any thank you gifts, compensation, or reimbursement to participants (for travel costs, etc.) or lack thereof?	**NO**	**NO** **Explain how**	**NO – NO such items are described or required.**
26. Does the PIS include a description of reasonably foreseeable risks[xxxii] or discomforts?	**NA – there will be none**	**YES**	
27. Does the PIS include a description of anticipated benefits to participants[xxxiii] and/or others?	**YES – though there will be no direct benefit to participants, there could be an associated benefit to the school culture and extended community for following year groups**	**YES**	

28. Does the PIS explain how the participant can contact the researcher? The Programme Director and the Chair of the OREC at Ethics@roehampton-online.com	**YES – via email**	**YES**	
29. Does the PIS describe how privacy will be maintained[xxxiv]?	**YES – a unique identifier generated sequentially from data base entries once any identifying columns have been removed.**	**YES**	
30. Does the PIS disclose all potential conflicts of interest (specifying that this study is separate from the researcher's other professional role)?	**YES – Essentially additional fun elements to core curriculum components that participants will be free to engage with as a motivator for enhanced engagement with BYOD**	**YES**	
31. Do the consent documents preserve the participant's legal[xxxv] rights?	**YES**	**NO** **Explain how**	**YES – participants are not asked to waive any legal rights.**

The remaining questions regarding sensitive content and vulnerable populations should be reviewed and addressed by the researcher (student) and faculty reviewer, but must also be confirmed by the International Online Research Ethics Committee before the study may go ahead.

Definition of Vulnerability

A UK term for an individual who is dependent on others and more susceptible to coercion; pressure; emotional, psychological or physical humiliation; has reduced ability to take care of him or herself, or to protect him or herself against significant harm or exploitation due to life circumstances, e.g. underage (under 16 years old); homeless; refugee; mentally ill; frail and elderly or with a cognitive impairment.

Vulnerability may be due to the power relationship of the researcher to the participant, ie a subordinate at work, patient or client of a health care professional, resident of a care home or other supported accommodation, teachers and their students, prison staff and prisoners. Where participants are in a relationship of dependency with researchers, researchers must take particular care throughout the research to minimise the impact of that dependency.

NOTE: When recruiting research participants who fall within this definition, initial consent should be obtained first from those who have a legal responsibility for their welfare or a duty of care, such as a parent or guardian, school, care home, charity or local authority [a 'Responsible Other']. However, a 'Responsible Other' cannot consent on behalf of the vulnerable person and passive consent, including group consent, given solely by a gatekeeper such as a School Principal or Senior Manager should be avoided wherever possible. Researchers should take appropriate and relevant steps to also obtain informed consent from the participant.

____Please place an X on this line if NONE of the questions in the next section are applicable to the proposed study.

32. If vulnerable individuals will be specifically sought out as participants, is such targeted recruitment justified[xxxvi] by a research design that will specifically benefit that vulnerable group at large?	**NA – no vulnerable individuals will be sought out**	**YES**	
33. If the researcher happens to also serve in a trusted or authoritative[xxxvii] role to the participant (e.g., health care provider, teacher etc.), do the recruitment procedures ensure voluntary participation?	**YES – There will be no influencer apart from the students own desire to engage with additional content that act as an enhancement to already available content and tasks**	**YES**	
34. If the research procedures might reveal or create an acute psychological state that necessitates referral, are there suitable procedures in place to manage this?	**NA – No such procedures**	**YES**	
35. If the research procedures might reveal criminal activity, child/elder abuse, or employer policy non-compliance that necessitates[xxxviii] reporting, are there suitable procedures in place for managing this? Are limits to confidentiality (i.e., duty to report) appropriately mentioned in the Participant Information Sheet?	**NA – no such procedures**	**YES**	

36. Education Programmes only: Does the research fall under the definition of usual curriculum or other institutional activities (see definition below) and do you have (or will obtain before research begins) the written approval for your research project from a senior member of school staff (or organization) with legal responsibility? **Definition of usual curriculum or other institutional activities** **The preparation, delivery and assessment of classes (one or more students) that are part of your agreed class / subject allocation for the academic year, following the usual curriculum for the subject area, with the usual student group.**	**YES – Usual Curriculum and verbal approval given, written approval to follow soon.**	**YES**	

ETHICS APPROVAL DECISION	
This document must be posted in the 'ethics' thread/forum in the student researcher's classroom after the supervising faculty member has rendered a decision. **The Research Proposal faculty member will mark an x next to box a, b, or c. If box a or b is marked, then the Research Proposal faculty member will also mark an x next to the applicable subcategory (1, 2, 3, etc.):**	
X	**A. APPROVED VIA EXPEDITED (LIGHT TOUCH) ETHICS REVIEW:** • **As the Research Proposal faculty member, I confirm that all applicable criteria 1-35 above are met with either a "Yes" or "N/A."** **For Education programmes only: Where 36 is met with a "Yes", Programme Director approval is indicated below** **Date:** **PD Name:** **PD Signature:** • **I understand my responsibilities, and will ensure to the best of my abilities that the student investigator abides by the University's policy on Research Ethics at all times.** • **I affirm that the research activities fall entirely within the parameters of the design, indicated with an X below (1, 2 or 3), that the Online Research Ethics Committee has authorized faculty members to approve via expedited (light touch) review:**
	1. The proposed study is analysis of public documents, artifacts, behaviour or data;
	2. The proposed study is secondary analysis of existing data that is privately held but released for research purposes (with all identifiers removed);
X	**3. The study will use surveys or interviews of non-vulnerable adults on non-sensitive topics (i.e., there is no potential to participants of coercion, distress, loss of work/school time, damage to professional reputation etc).**

	B. REFERRED TO ETHICS COMMITTEE: **As the initial reviewer, I am referring this study to the full ethics committee (OREC) as indicated below [please mark 1, 2, 3, 4 or Other below].** **I will email the student's ethics application and all attachments, including the Module 7 Faculty Checklist, as a single zip file to the ethics committee via Ethics@roehampton-online.com, copying the Programme Director.** **The ethics committee meets every two weeks and accepts applications at any time. The application may not necessarily be presented at the next OREC meeting if it is received less than one week before the meeting date.** **Module 7 faculty will be notified of the date the application will be reviewed.** **Decisions and feedback will be emailed to the student and Module 7 faculty member within 5 business days of the review.**
	1. The researcher proposes to collect data from vulnerable individuals such as children, clinic patients, prisoners, military personnel, facility residents, anyone over whom the researcher holds authority (e.g., students, subordinates etc), anyone who might feel undue pressure to participate in the study, or any individuals with severe enough mental disabilities to interfere with capacity to consent to the study.
	2. Some (potential) participants may find the research topic or premise sensitive
	3. Participants' jobs or livelihoods may be placed at risk by the study activities
	4. The participants' culture and/or international location suggest that extra participant protections may be necessary
	Other: _____
X	**C. REVISIONS REQUIRED:** **The student needs to revise the proposal and ethics materials to address the concerns in the yellow column and resubmit to me before I can select A or B above.**

Appendix B: Kings` School Pupil BYOD and iPad policy

Kings' Schools

Pupil BYOD & iPad Policy

Introduction

At Kings' Schools, IT is used across the curriculum to support learning. Pupils are being educated to safely use current technology to enhance their learning and collaborate with others. This policy should be read in conjunction with the Technology and Social Media Use Policy.

Aims

- **To explain how BYOD (Bring Your Own Device) and iPads should be used by students in Kings' schools**
- **To provide clear guidelines on the expectations of all pupils.**

Expectations of Pupils at Kings' Schools

Pupils in Kings' schools use a range of IT equipment. This policy relates to pupils' personally owned devices, though the usage principles apply to any device in school.

Students' personally owned devices are strictly only for educational use during structured lesson time.

Where 'devices' are mentioned below relates to, but is not limited to: laptops, iPads, tablets and phones.

BYOD / iPad Agreement

Pupils in secondary take part in a BYOD program to support their learning. Pupils in Years 4, 5 and 6 bring their own iPads as part of the Kings' 1:1 iPad initiative. Year 3 pupils are introduced to the iPad initiative in the second part of Term 3 in preparation for their next three years. Below are the rules related to iPad and BYOD use in Kings' schools:

- **The use of devices is strictly for educational purposes only. Pupils are not allowed to use personal apps / programs that are not directly related to supporting their learning**
- **Apps installed on pupil owned devices should always be age appropriate**
- **All pupils involved in BYOD and iPad programmes will supply their own devices and be responsible for its safety**
- **It is the choice of individual families to insure devices against loss or damage**
- **Kings' schools are not responsible or liable for loss or damage of pupils' personal devices or cases**
- **Each device should be in an appropriate and protective case which allows for the easy carrying of the device. For iPads, the protective case must fully cover both the back and front of the iPad. Magnetic covers that clip on and off are not appropriate**
- **Each device should be clearly labelled on the case and the device itself, both physically and electronically**

- **It would be beneficial for pupils to own a set of ear-pods for occasions when they may need to watch video tutorials or make a recording as part of a lesson**
- **It is recommended that students use a background picture of themselves on the login / pass code screen, with their name visible to aid with the identification of the device's owner**
- **It is the pupil's responsibility to remember, maintain and ensure access codes are used to protect their device**
- **Kings' Schools are not responsible for restoring devices where the access code has been forgotten or it has become locked**

- Device cameras and microphone:

    - Students must use good judgment when using the camera. The student agrees that the camera will not be used to take illicit or inappropriate photographs or videos, nor will it be used to embarrass anyone in any way
    - Students must not record or photograph staff without their prior consent
    - Images of other people may only be made with the permission of those in the photograph / video
    - **The camera should only be used once permission has been given by the teacher in charge of the class**

- **Devices should not be used by pupils either before or after school, whilst on the school premises such as during Early Bird Club. Pupils who use devices at such times will be restricted for that day**
- **It is the pupil's responsibility to ensure their device is fully charged at the beginning of each day**
- **It is the pupil's responsibility to maintain sufficient memory capacity on their device to enable its use for educational purposes**
- **Pupils must have the most commonly used apps and programs installed on their devices, including all apps on the app list (iPad programme)**
- **Pupils are prohibited from downloading media files for their personal use while in school**
- **Pupils must ensure that they have virus protection software on their device and ensure it is kept up to date**
- **Tracking software or apps such as 'Find my iPad' must be enabled in order to support finding the location of the device if it goes missing**
- **It is the pupil's responsibility to ensure the latest software is installed on their devices and all apps / programs are kept up to date**
- **Any inappropriate use of the device or failure to follow instructions may result in the confiscation of the device. All cases will be dealt with independently and where appropriate the Kings' Behaviour Policy will be followed.**

Pupil BYOD and iPad Agreement

As a pupil at a Kings' school, I agree to the following BYOD and iPad Agreement.

I, _____ of class _____
agree that I will:

- **act responsibly with my device**
- **remember to bring my device to school each day fully charged**
- **ensure that the apps I need for learning are installed on my device**
- **never photograph, video or record other pupils or staff at school unless I have been requested to by my teacher**
- **only access the systems and my device with my own login and password, which I will keep secret**
- **not access another person's device or storage area, or interfere with other people's work or files**
- **use my device only for learning activities when my teacher asks me to while in school and only use the apps I am required to use**
- **always send polite messages that are only linked to my learning**
- **always report any unpleasant messages sent to me to my teacher**
- **not use my device outside of lesson time such as during Early Bird sessions or whilst waiting to be collected after school**
- **only connect my device to the internet using the school's network.**

As a pupil of Kings' schools, I promise to follow the BYOD and iPad Agreement and the Technology and Social Media Use Policy.

Signed:(Pupil) _____

Date _____

As parent/legal guardian of the pupil named above, I will endeavour to help uphold and support the BYOD and iPad Agreement and the Technology and Social Media Use Policy.

Signed:(Parent/Guardian)_____Date:_____

This agreement is to be returned to your class teacher.

Appendix C: Participant Consent Form

Title of Research Project: ***Can gamification or Game Based Learning via BYOD increase active engagement in learning activities for students age 8 - 11 years?***

Brief description of research study, and what participation involves:

Gamification, or the inclusion of elements usually found within games, into teaching and learning activities is not a new phenomenon. However, as its use becomes wider spread and accepted within education, there is an agreed requirement for more research and perhaps some research towards the possible quantifiable gains.

Thus the topic of study for this work is ***`Leveraging Educational Technology to increase pupils` engagement: Challenges and the way forward`*** and addresses the main question of **Can gamification or Game Based Learning via BYOD increase active engagement in learning activities for students age 8 - 11 years? Which will be further broken down into the following sub-questions:**

- ***how can using BYOD improve the delivery of lesson content for 8-11 year old's across the curriculum?***
- ***what impact does an increase in engagement by using gamified content have on student achievement?***
- ***what are the benefits of collecting and grading students work using VLEs?***

The research will involve students of year groups 4, 5 and 6 during their timetabled computing lessons and their class teachers. It aims to track whether the use of a game based platform (CLASSCRAFT.com) and gamified elements of lesson delivery and interaction can impact active engagement in lesson content and a student's` use and habits of their BYOD in general.

Data will be gathered via the use of an online platforms that records the interactions a user has. Such interactions may be content sections that they have completed or questions they have answered. Questionnaires will also be sent to teachers of participating classes to help document any observable impact from this work on other area of BYOD usage. The data gathered will be anonymous and voluntary, it will be used to analyse the results to better inform teaching practice as to whether such tools have a quantifiable benefit, and if so to suggest some ways in which they can be seamlessly integrated to common teaching practices.

There will be no impact on the curriculum content delivered, and any material accessed via the gamified platform will always have a more traditional method of delivery as well (via the already used Google Classroom).

Students will always have the right to withdraw from this research and can be assured that there will be no negative outcomes associated with their withdrawal and any data recorded for the research shall be deleted.

Researcher name and contact details:
Habeeb Mustafa habeeb.mustafa@roehampton-online.ac.uk

Consent Statement:

1. I freely agree to take part in this research.
2. I have read and received a copy of this consent form and have been given the opportunity to ask questions. You have given me: (a) an explanation of the procedures to be followed in the study and (b) answers to any questions I have asked.
3. I understand that there may be no direct benefit to me from my participation in the study described above.
4. I understand that my participation will not cost me anything other than the time and effort involved.
5. I understand that this study is entirely anonymous. My identity will not be recorded or passed on to anyone not involved in this study, and will be protected in the writing up of the findings. The researcher involved in the study will be unaware of any links between my identity and the data collected, and accordingly no individual feedback will be given.
6. ***I understand that the information I provide will be treated in confidence by the researcher, that my identity will be protected in the publication of any findings and that all data will be collected and processed in accordance with the UK's Data Protection Act 1998 and with the University's Data Protection Policy.***
7. ***I am aware that I am free to withdraw at any point without giving a reason, although if I do so I understand that my data might still be used in a collated form but this will not be identifiable to me as an individual.***
8. I confirm that I have read and understood the above and have been given adequate time to consider my participation and agree to comply with the instructions and any restrictions of the study.

Signed on behalf of student KA_____ by parent or guardian

Signature:

Name: Date:

Please note: if you have a concern about any aspect of your participation or any other queries, please raise this with the researcher. If the researcher is a student, you may wish to contact the Programme Director or the Chair of the Roehampton Online Research Ethics Committee:

Student Researcher contact details:
Name **Habeeb Mustafa**
Email habeeb.mustafa@roehampton-online.ac.uk

However, if you would like to contact an independent party, you can contact the Academic Director for the University of Roehampton Online programmes.

Programme Director contact details:
Name Janet Nichols
Email janet.nichols@roehampton-online.ac.uk

Chair of the Roehampton Online Research Ethics Committee contact details:
Name Dr Susan Iacovou
Email ethics@roehampton-online.com

Appendix D: Student and Staff Pre/Post Surveys

Appendix D1: **Student Pretest Questionnaire**
When using your iPad (BYOD) in computing lessons…
The answers for these questions go from Totally Disagreeing to Totally Agreeing in the following way

Totally disagree, Mostly disagree, Disagree a little bit, Neither Agree or disagree, Agree a little bit, Mostly agree, Totally agree.

Remember you can be totally honest, no one will see these answers with your name by them.
Motivational Believes 1 - Self-Efficacy

- I expect to do well in this class
- I am sure I understand the things taught in this class
- I think I am a good student
- I am sure that I can do an excellent job on the questions and tasks I am assigned
- I think I will get a good report at the end of the year
- I think I know a lot about this subject
- I know that I will be able to achieve all the required learning for this class

Motivational Believes 2- Intrinsic Value

- I prefer class work that is challenging so I can learn new concepts
- It is important for me to learn what is being taught in class
- I like what I am learning in this class
- I think I will be able to use what I learn in this class to help me in other subjects.
- I often choose challenging tasks even if I know they will take more effort to finish.
- If I get something wrong, I try to learn from my mistakes
- Understanding this subject is important to me

Learning Strategies 1 – Cognitive

- I bring my iPad to school every day
- My iPad is fully charged at the start of school
- My iPad is always ready in the way my teacher expects
- I can fix most problems with the settings on my iPad by myself
- I know the username and password for my school's email
- I know the username and password to access the school computers and WiFi.
- When I have a problem with my iPad I go to an adult for help before trying to fix it myself
- I know where to go to find the lesson resources
- I know how to hand in my work for computing lessons

Learning Strategies 2 - self-regulation

- I know when to hand in my work for computing lessons
- I feel I must complete tasks on time
- I do my best to complete tasks in time
- I am up-to-date with my tasks and have handed in everything I need to hand in
- I know how to ask for more help from my teacher when not in class
- I feel comfortable asking for more help when I need it
- I often do more than what is required of me in computing lessons
- I know what I need to do in class to complete the learning objective

1 Behavioural Engagement,

- I pay attention in class
- I find it easy to control my behaviour in class
- Sometimes I just act as if I am working
- I follow school rules
- I am often told off in class

2 Emotional Engagement

- I feel happy in class
- I feel excited by the work we do
- I feel excited by the way we do the work
- I find the work we do interesting
- I find the work we do useful to me
- I like to come to class
- I find the class fun

3 Cognitive Engagement

- If I do not understand the work I do my best to find out or ask questions
- I spend time on class tasks out of lesson time
- I like to find things outside of class and try to make links to help me understand class work better
- I check my own work for mistakes
- I do extra research to make sure I understand to the best of my ability.

Appendix D2: **Student Posttest Questionnaire**

When using your iPad (BYOD) in computing lessons…

The answers for these questions go from Totally Disagreeing to Totally Agreeing in the following way

Totally disagree, Mostly disagree, Disagree a little bit, Neither Agree or disagree, Agree a little bit, Mostly agree, Totally agree.

Remember you can be totally honest, no one will see these answers with your name by them.

Motivational Believes 1 - Self-Efficacy

- I expect to do well in this class
- I am sure I understand the things taught in this class
- I think I am a good student
- I am sure that I can do an excellent job on the questions and tasks I am assigned
- I think I will get a good report at the end of the year
- I think I know a lot about this subject
- I know that I will be able to achieve all the required learning for this class

Motivational Believes 2- Intrinsic Value

- I prefer class work that is challenging so I can learn new concepts
- It is important for me to learn what is being taught in class
- I like what I am learning in this class
- I think I will be able to use what I learn in this class to help me in other subjects.

- I often choose challenging tasks even if I know they will take more effort to finish.
- If I get something wrong, I try to learn from my mistakes
- Understanding this subject is important to me

Learning Strategies 1 – Cognitive

- I bring my iPad to school every day
- My iPad is fully charged at the start of school
- My iPad is always ready in the way my teacher expects
- I can fix most problems with the settings on my iPad by myself
- I know the username and password for my school's email
- I know the username and password to access the school computers and WiFi.
- When I have a problem with my iPad I go to an adult for help before trying to fix it myself
- I know where to go to find the lesson resources
- I know how to hand in my work for computing lessons

Learning Strategies 2 - self-regulation

- I know when to hand in my work for computing lessons
- I feel I must complete tasks on time
- I do my best to complete tasks in time
- I am up-to-date with my tasks and have handed in everything I need to hand in
- I know how to ask for more help from my teacher when not in class
- I feel comfortable asking for more help when I need it
- I often do more than what is required of me in computing lessons
- I know what I need to do in class to complete the learning objective

1 Behavioral Engagement,

- I pay attention in class
- I find it easy to control my behavior in class
- Sometimes I just act as if I am working
- I follow school rules
- I am often told off in class

2 Emotional Engagement

- I feel happy in class
- I feel excited by the work we do
- I feel excited by the way we do the work
- I find the work we do interesting
- I find the work we do useful to me
- I like to come to class
- I find the class fun

3 Cognitive Engagement

- If I do not understand the work I do my best to find out or ask questions
- I spend time on class tasks out of lesson time
- I like to find things outside of class and try to make links to help me understand class work better
- I check my own work for mistakes
- I do extra research to make sure I understand to the best of my ability.

Appendix D3: **Staff Pretest Questionnaire**

- Year group taught

The answers to these questions reflect what percentage of students the statement applies to in approximately 25% increments. Thus, Strongly Agree would indicate nearly all students, all the time and Strongly Disagree would indicate only one or two occasions all the time.

Before the use of Classcraft as a gamified engagement platform for learning activities and additional studies….

(Motivation)

- Students brought their iPad to school every day
- Students' iPads were fully charged at the start of the day
- Students' iPads have all the required apps installed as mentioned on the app list
- Students were always ready and able ready to begin any learning activities that were planned for use with their iPads, but do not specifically require the Internet

(Learning strategies)

- Students were independently aware of their school's WiFi login and school's Google email usernames and passwords
- Devices were fully connected to STUDENTS-BYOD network with the correct trust relationships and certificates fully installed and thus ready to access online content.
- Any required iOS or app updates were checked for and installed by students on their devices at least once a week
- Students independently try to find solutions to any hardware or software problems they face with their BYOD before asking a teacher or going to IT Support

(Engagement)

- Students are eager to use their iPad in school lessons and activities.
- Students suggested ways that they could support their learning by using their iPads.
- Students participate in independent tasks that require the use BYOD effectively.
- Students participate in group tasks that require the use BYOD effectively, such as collaborative research or presentations.
- Students show a general interest in technology
- Students show an interest in developing their own digital literacy skills
- Students exhibit good Digital Citizenship
- Students independently look for new and innovative ways to use their BYOD above and beyond a teacher's instruction.

In your opinion what are the greatest benefits to BYOD in Schools?
In your opinion what are the biggest barriers to efficient and effective BYOD integration in schools?

Appendix D4: **Staff Posttest Questionnaire**

The answers to these questions reflect what percentage of students the statement applies to in approximately 25% increments. Thus, Strongly Agree would indicate nearly all students, all the time and Strongly Disagree would indicate only one or two occasions all the time.

After the use of Classcraft as a gamified engagement platform for learning activities and additional studies….

(Motivation)

- Students brought their iPad to school every day
- Students' iPads were fully charged at the start of the day
- Students' iPads have all the required apps installed as mentioned on the app list
- Students were always ready and able ready to begin any learning activities that were planned for use with their iPads, but do not specifically require the Internet

(Learning strategies)

- Students were independently aware of their school's WiFi login and school's Google email usernames and passwords
- Devices were fully connected to STUDENTS-BYOD network with the correct trust relationships and certificates fully installed and thus ready to access online content.
- Any required iOS or app updates were checked for and installed by students on their devices at least once a week
- Students independently try to find solutions to any hardware or software problems they face with their BYOD before asking a teacher or going to IT Support

(Engagement)

- Students are eager to use their iPad in school lessons and activities.
- Students suggested ways that they could support their learning by using their iPads.
- Students participate in independent tasks that require the use BYOD effectively.
- Students participate in group tasks that require the use BYOD effectively, such as collaborative research or presentations.
- Students show a general interest in technology
- Students show an interest in developing their own digital literacy skills
- Students exhibit good Digital Citizenship
- Students independently look for new and innovative ways to use their BYOD above and beyond a teacher's instruction.

In your opinion what are the greatest benefits to BYOD in Schools?
In your opinion what are the biggest barriers to efficient and effective BYOD integration in schools?

Appendix E : Student data paired t tests

Motivational Believes 1 - Self-Efficacy

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_I_expect_to_do_well_in_this_class - R_POST_I_expect_to_do_well_in_this_class	.00000	1.21999	.18392	-.37091	.37091	.000	43	1.000
Pair 2	R_PRE_I_am_sure_I_understand_the_things_taught_in_this_class - R_POST_I_am_sure_I_understand_the_things_taught_in_this_class	-.31818	1.36011	.20504	-.73169	.09533	-1.552	43	.128
Pair 3	R_PRE_I_think_I_am_a_good_student - R_POST_I_think_I_am_a_good_student	.13636	1.19283	.17983	-.22629	.49902	.758	43	.452
Pair 4	R_PRE_I_am_sure_that_I_can_do_an_excellent_job_on_the_questions_and_tasks_I_am_assigned - R_POST_I_am_sure_that_I_can_do_an_excellent_job_on_the_questions_and_tasks_I_am_assigned	-.02273	1.32048	.19907	-.42419	.37873	-.114	43	.910
Pair 5	R_PRE_I_think_I_will_get_a_good_report_at_the_end_of_the_year - R_POST_I_think_I_will_get_a_good_report_at_the_end_of_the_year	-.22727	1.36166	.20528	-.64126	.18671	-1.107	43	.274
Pair 6	R_PRE_I_think_I_know_a_lot_about_this_subject - R_POST_I_think_I_know_a_lot_about_this_subject	-.20455	1.39066	.20965	-.62734	.21825	-.976	43	.335
Pair 7	R_PRE_I_know_that_I_will_be_able_to_achieve_all_the_required_learning_for_this_class - R_POST_I_know_that_I_will_be_able_to_achieve_all_the_required_learning_for_this_class	-.20455	1.15294	.17381	-.55507	.14598	-1.177	43	.246

Motivational Believes 2- Intrinsic Value

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_I_prefer_class_work_that_is_challenging_so_I_can_learn_new_concepts - R_POST_I_prefer_class_work_that_is_challenging_so_I_can_learn_new_concepts	-.18182	1.31667	.19850	-.58212	.21849	-.916	43	.365
Pair 2	R_PRE_It_is_important_for_me_to_learn_what_is_being_taught_in_class - R_POST_It_is_important_for_me_to_learn_what_is_being_taught_in_class	.04545	.88802	.13387	-.22453	.31544	.340	43	.736
Pair 3	R_PRE_I_like_what_I_am_learning_in_this_class - R_POST_I_like_what_I_am_learning_in_this_class	-.22727	1.25501	.18920	-.60883	.15429	-1.201	43	.236
Pair 4	R_PRE_I_think_I_will_be_able_to_use_what_I_learn_in_this_class_to_help_me_in_other_subjects - R_POST_I_think_I_will_be_able_to_use_what_I_learn_in_this_class_to_help_me_in_other_subjects	-.22727	1.46055	.22019	-.67132	.21677	-1.032	43	.308
Pair 5	R_PRE_I_often_choose_challenging_tasks_even_if_I_know_they_will_take_more_effort_to_finish - R_POST_I_often_choose_challenging_tasks_even_if_I_know_they_will_take_more_effort_to_finish	-.15909	1.61307	.24318	-.64951	.33133	-.654	43	.516
Pair 6	R_PRE_If_I_get_something_wrong_I_try_to_learn_from_my_mistakes - R_POST_If_I_get_something_wrong_I_try_to_learn_from_my_mistakes	.06818	1.06526	.16059	-.25569	.39205	.425	43	.673
Pair 7	R_PRE_Understanding_this_subject_is_important_to_me - R_POST_Understanding_this_subject_is_important_to_me	.36364	1.43204	.21589	-.07174	.79902	1.684	43	.099

Learning Strategies 1 – Cognitive

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_I_bring_my_iPad_to_school_every_day - R_POST_I_bring_my_iPad_to_school_every_day	-.13636	1.00211	.15107	-.44103	.16831	-.903	43	.372
Pair 2	R_PRE_My_iPad_is_fully_charged_at_the_start_of_school - R_POST_My_iPad_is_fully_charged_at_the_start_of_school	-.18182	1.18661	.17889	-.54258	.17894	-1.016	43	.315
Pair 3	R_PRE_My_iPad_is_always_ready_in_the_way_my_teacher_expects - R_POST_My_iPad_is_always_ready_in_the_way_my_teacher_expects	-.09091	.91036	.13724	-.36768	.18587	-.662	43	.511
Pair 4	R_PRE_I_can_fix_most_problems_with_the_settings_on_my_iPad_by_myself - R_POST_I_can_fix_most_problems_with_the_settings_on_my_iPad_by_myself	-.20455	1.09075	.16444	-.53617	.12707	-1.244	43	.220
Pair 5	R_PRE_I_know_the_username_and_password_for_my_school's_email - R_POST_I_know_the_username_and_password_for_my_school's_emai	.02273	.69846	.10530	-.18962	.23508	.216	43	.830
Pair 6	R_PRE_I_know_the_username_and_password_to_access_the_school_computers_and_WiFi - R_POST_I_know_the_username_and_password_to_access_the_school_computers_and_WiFi	-.45455	1.43793	.21678	-.89172	-.01737	-2.097	43	.042
Pair 7	PRE_When_I_have_a_problem_with_my_iPad_I_go_to_an_adult_for_help - POST_When_I_have_a_problem_with_my_iPad_I_go_to_an_adult_for_hel	-.1364	2.8982	.4369	-1.0175	.7448	-.312	43	.756
Pair 8	R_PRE_I_know_where_to_go_to_find_the_lesson_resources - R_POST_I_know_where_to_go_to_find_the_lesson_resources	-.29545	1.28641	.19393	-.68656	.09565	-1.523	43	.135
Pair 9	R_PRE_I_know_how_to_hand_in_my_work_for_computing_lessons - R_POST_I_know_how_to_hand_in_my_work_for_computing_lessons	-.11364	1.01651	.15325	-.42268	.19541	-.742	43	.462

Learning Strategies 2 - self-regulation

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_I_know_when_to_hand_in_my_work_for_computing_lessons - R_POST_I_know_when_to_hand_in_my_work_for_computing_lessons	-.09091	1.00737	.15187	-.39718	.21536	-.599	43	.553
Pair 2	R_PRE_I_feel_I_must_complete_tasks_on_time - R_POST_I_feel_I_must_complete_tasks_on_time	.11364	1.54342	.23268	-.35561	.58288	.488	43	.628
Pair 3	R_PRE_I_do_my_best_to_complete_tasks_in_time - R_POST_I_do_my_best_to_complete_tasks_in_time	-.06818	1.16933	.17628	-.42369	.28733	-.387	43	.701
Pair 4	R_PRE_I_am_uptodate_with_my_tasks_and_have_handed_in_everything_I_need_to_hand_in - R_POST_I_am_uptodate_with_my_tasks_and_have_handed_in_everything_I_need_to_hand_in	-.27273	1.49982	.22611	-.72872	.18326	-1.206	43	.234
Pair 5	R_PRE_I_know_how_to_ask_for_more_help_from_my_teacher_when_not_in_class - R_POST_I_know_how_to_ask_for_more_help_from_my_teacher_when_not_in_class	-.27907	1.45284	.22156	-.72619	.16805	-1.260	42	.215
Pair 6	R_PRE_I_feel_comfortable_asking_for_more_help_when_I_need_it - R_POST_I_feel_comfortable_asking_for_more_help_when_I_need_it	.15909	1.65576	.24962	-.34431	.66249	.637	43	.527
Pair 7	R_PRE_I_often_do_more_than_what_is_required_of_me_in_computing_lessons - R_POST_I_often_do_more_than_what_is_required_of_me_in_computing_lessons	-.32558	1.26719	.19324	-.71556	.06440	-1.685	42	.099
Pair 8	R_PRE_I_know_what_I_need_to_do_in_class_to_complete_the_learning_objective - R_POST_I_know_what_I_need_to_do_in_class_to_complete_the_learning_objective	-.11364	1.06128	.15999	-.43630	.20902	-.710	43	.481

1 Behavioural Engagement,

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_I_pay_attention_in_class - R_POST_I_pay_attention_in_class	-.15909	1.03302	.15573	-.47316	.15498	-1.022	43	.313
Pair 2	R_PRE_I_find_it_easy_to_control_my_behaviour_in_class - R_POST_I_find_it_easy_to_control_my_behaviour_in_class	.02273	1.24804	.18815	-.35671	.40217	.121	43	.904
Pair 3	PRE_Sometimes_I_just_act_as_if_I_am_working - POST_Sometimes_I_just_act_as_if_I_am_working	.1818	2.5814	.3892	-.6030	.9666	.467	43	.643
Pair 4	R_PRE_I_follow_school_rules - R_POST_I_follow_school_rules	-.02273	1.06724	.16089	-.34720	.30174	-.141	43	.888
Pair 5	PRE_I_am_often_told_off_in_class - POST_I_am_often_told_off_in_class	-.0227	2.0287	.3058	-.6395	.5941	-.074	43	.941

2 Emotional Engagement

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_I_feel_happy_in_class - R_POST_I_feel_happy_in_class	-.04545	1.44600	.21799	-.48508	.39417	-.209	43	.836
Pair 2	R_PRE_I_feel_excited_by_the_work_we_do - R_POST_I_feel_excited_by_the_work_we_do	-.15909	1.47763	.22276	-.60833	.29015	-.714	43	.479
Pair 3	R_PRE_I_feel_excited_by_the_way_we_do_the_work - R_POST_I_feel_excited_by_the_way_we_do_the_work	-.20455	1.45601	.21950	-.64721	.23812	-.932	43	.357
Pair 4	R_PRE_I_find_the_work_we_do_interesting - R_POST_I_find_the_work_we_do_interesting	-.20455	1.40728	.21216	-.63240	.22331	-.964	43	.340
Pair 5	R_PRE_I_find_the_work_we_do_useful_to_me - R_POST_I_find_the_work_we_do_useful_to_me	-.27273	1.43646	.21655	-.70945	.16400	-1.259	43	.215
Pair 6	R_PRE_I_like_to_come_to_class - R_POST_I_like_to_come_to_class	-.06818	1.42074	.21418	-.50013	.36376	-.318	43	.752
Pair 7	R_PRE_I_find_the_class_fun - R_POST_I_find_the_class_fun	.00000	1.16139	.17509	-.35310	.35310	.000	43	1.000

3 Cognitive Engagement

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_If_I_do_not_understand_the_work_I_do_my_best_to_find_out_or_ask_questions - R_POST_If_I_do_not_understand_the_work_I_do_my_best_to_find_out_or_ask_questions	-.18182	1.40220	.21139	-.60813	.24449	-.860	43	.395
Pair 2	R_PRE_I_spend_time_on_class_tasks_out_of_lesson_time - R_POST_I_spend_time_on_class_tasks_out_of_lesson_time	-.27273	1.56061	.23527	-.74720	.20174	-1.159	43	.253
Pair 3	R_PRE_I_like_to_find_things_outside_of_class_and_try_to_make_links_to_help_me_understand_class_work_better - R_POST_I_like_to_find_things_outside_of_class_and_try_to_make_links_to_help_me_understand_class_work_better	.02273	1.75855	.26511	-.51192	.55738	.086	43	.932
Pair 4	R_PRE_I_check_my_own_work_for_mistakes - R_POST_I_check_my_own_work_for_mistakes	.02273	1.35524	.20431	-.38930	.43476	.111	43	.912
Pair 5	R_PRE_I_do_extra_research_to_make_sure_I_understand_to_the_best_of_my_ability - R_POST_I_do_extra_research_to_make_sure_I_understand_to_the_best_of_my_ability	.00000	1.44673	.21810	-.43985	.43985	.000	43	1.000

Appendix F: Staff data paired t tests

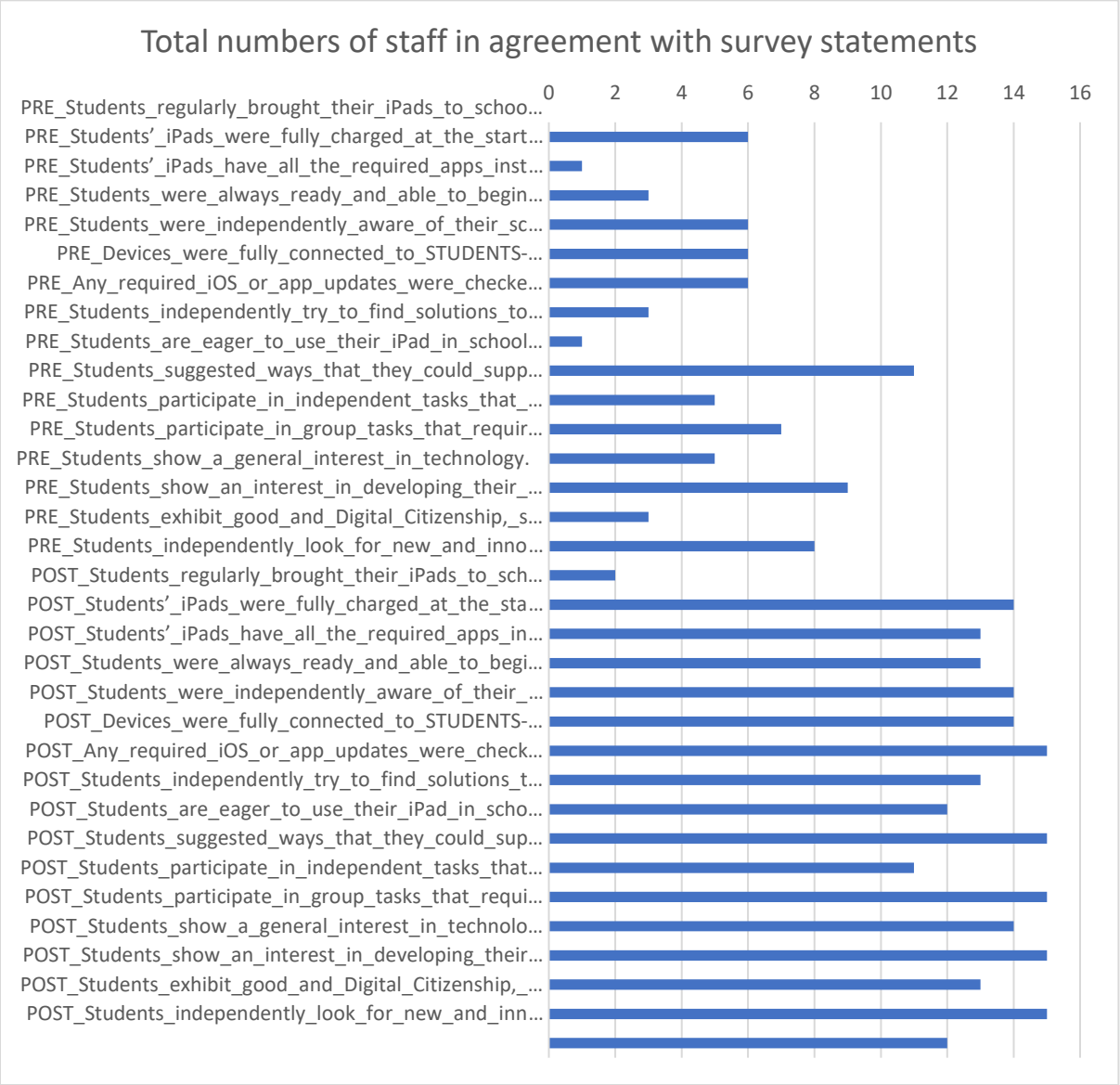
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	R_PRE_Students_regularly_brought_their_iPads_to_school_every_day - R_POST_Students_regularly_brought_their_iPads_to_school_every_day	-1.06667	1.53375	.39601	-1.91603	-.21731	-2.694	14	.017
Pair 2	R_PRE_Students_iPads_were_fully_charged_at_the_start_of_the_day - R_POST_Students_iPads_were_fully_charged_at_the_start_of_the_day	-1.46667	.99043	.25573	-2.01515	-.91818	-5.735	14	.000
Pair 3	R_PRE_Students_iPads_have_all_the_required_apps_installed_as_mentioned_on_the_app_list - R_POST_Students_iPads_have_all_the_required_apps_installed_as_mentioned_on_the_app_list	-1.46667	.99043	.25573	-2.01515	-.91818	-5.735	14	.000
Pair 4	R_PRE_Students_were_always_ready_and_able_to_begin_any_learning_activities_that_were_planned_for_use_with_their_iPads,_b - R_POST_Students_were_always_ready_and_able_to_begin_any_learning_activities_that_were_planned_for_use_with_their_iPads_b	-1.20000	1.26491	.32660	-1.90048	-.49952	-3.674	14	.003
Pair 5	R_PRE_Students_were_independently_aware_of_their_school's_WiFi_login_and_schools_Google_email_usernames_and_passwords - R_POST_Students_were_independently_aware_of_their_schools_WiFi_login_and_schools_Google_email_usernames_and_passwords	-1.20000	1.20712	.31168	-1.86848	-.53152	-3.850	14	.002
Pair 6	R_PRE_Devices_were_fully_connected_to_STUDENTSBYOD_network_with_the_correct_trust_relationships_and_certificates_fully_i - R_POST_Devices_were_fully_connected_to_STUDENTSBYOD_network_with_the_correct_trust_relationships_and_certificates_fully_	-1.46667	1.18723	.30654	-2.12413	-.80920	-4.785	14	.000
Pair 7	R_PRE_Any_required_iOS_or_app_updates_were_checked_for_and_installed_by_students_on_their_devices_at_least_once_a_week - R_POST_Any_required_iOS_or_app_updates_were_checked_for_and_installed_by_students_on_their_devices_at_least_once_a_week	-1.20000	1.26491	.32660	-1.90048	-.49952	-3.674	14	.003
Pair 8	R_PRE_Students_independently_try_to_find_solutions_to_any_hardware_or_software_problems_they_face_with_their_BYOD_before - R_POST_Students_independently_try_to_find_solutions_to_any_hardware_or_software_problems_they_face_with_their_BYOD_befor	-1.53333	1.06010	.27372	-2.12040	-.94627	-5.602	14	.000
Pair 9	R_PRE_Students_are_eager_to_use_their_iPad_in_school_lessons_and_activities - R_POST_Students_are_eager_to_use_their_iPad_in_school_lessons_and_activities	-1.13333	1.76743	.45635	-2.11210	-.15456	-2.483	14	.026
Pair 10	R_PRE_Students_suggested_ways_that_they_could_support_their_learning_by_using_their_iPads - R_POST_Students_suggested_ways_that_they_could_support_their_learning_by_using_their_iPads	-1.00000	1.13389	.29277	-1.62793	-.37207	-3.416	14	.004
Pair 11	R_PRE_Students_participate_in_independent_tasks_that_require_the_use_BYOD_effectively - R_POST_Students_participate_in_independent_tasks_that_require_the_use_BYOD_effectively	-1.40000	1.24212	.32071	-2.08786	-.71214	-4.365	14	.001
Pair 12	R_PRE_Students_participate_in_group_tasks_that_require_the_use_of_BYOD_effectively_For_example_collaborative_research_pr - R_POST_Students_participate_in_group_tasks_that_require_the_use_of_BYOD_effectively_For_example_collaborative_research_p	-1.13333	1.12546	.29059	-1.75659	-.51007	-3.900	14	.002
Pair 13	R_PRE_Students_show_a_general_interest_in_technology - R_POST_Students_show_a_general_interest_in_technology	-.73333	1.70992	.44150	-1.68025	.21359	-1.661	14	.119
Pair 14	R_PRE_Students_show_an_interest_in_developing_their_own_digital_literacy_skills - R_POST_Students_show_an_interest_in_developing_their_own_digital_literacy_skills	-1.33333	1.04654	.27021	-1.91289	-.75378	-4.934	14	.000
Pair 15	R_PRE_Students_exhibit_good_and_Digital_Citizenship_such_as_responsible_and_respectful_use_of_their_devices_or_construct - R_POST_Students_exhibit_good_and_Digital_Citizenship_such_as_responsible_and_respectful_use_of_their_devices_or_construc	-1.33333	1.23443	.31873	-2.01694	-.64973	-4.183	14	.001
Pair 16	R_PRE_Students_independently_look_for_new_and_innovative_ways_to_use_their_BYOD_and_enhance_their_learning_above_and_bey - R_POST_Students_independently_look_for_new_and_innovative_ways_to_use_their_BYOD_and_enhance_their_learning,_above_and_b	-.73333	1.22280	.31573	-1.41050	-.05617	-2.323	14	.036

Appendix G: Teacher Survey additional comments

	PRE		POST	
Teacher	In your opinion what are the greatest benefits to BYOD in Schools?	In your opinion what are the biggest barriers to efficient and effective BYOD integration in schools?	In your opinion what are the greatest benefits to BYOD in Schools?	In your opinion what are the biggest barriers to efficient and effective BYOD integration in schools?
1	*No answer*	*No answer*	*No answer*	*No answer*
2	Children having quick access to their own device in the classroom so they can be used within lessons regardless of Whether they were planned in the original lesson. For example using it has a thesaurus or carrying out a quick research task, taking photos etc. Children are also very engaged with their learning when using their own devices, particularly when educational games are involved.	Slow internet connection resulting in some students being able to carry out a task and others being delayed. Children not looking after their device.	The Ipads can utilized effectively.	Some children have everything done for them at home and therefore struggle with the responsibility.
3	Engagement of children. Independence in learning. Opportunities to present in chosen style.	Children not always having apps. When children do not have enough storage space on their iPads. Not being fully charged or forgotten iPads.	Paperless and being able to easy take work home to mark rather than carrying all books	Student ability and the availability of devices
4	independent/collaborative research, allows them to search for their own solutions instead of asking teacher for answers which is a more effective way of learning	the very poor connection (especially if when a certain amount of iPads in classroom are connected then some are unable to), unable to connect to gmail and drive even when connected to byod, limited access	constant access to online resources	They can be a distraction and if not all students bring them the lesson can grind to a halt.
5	evidence of learning and use of videos for blended learning etc	when things dont work as planned	Being able to independently access content when needed	WiFi issues, students with broken ipads or incorrect devices and apps
6			Using sites like Pobble and seesaw to record learning and reach an authentic audience	the cost to parents, poor wifi in school and lack of charging facilities.
7	Improving children's ownership of their learning	Parent support	Increased independence, wider scope for learning (SAMR model for example), greater access to learning/teaching content, (saves paper), time saver!	Children not always having trust permissions/all of the apps - despite being constantly reminded (even missing out) - and them not knowing/being willing to find out what to do to fix this independently without ICT dept or class teacher
8	Wider variety of ways to teach and learn, engagement in learning, accessibility, potential to develop independence	despite the BYOD policy, children's ICT skills are poor, their independence is lacking and not all of the children know how to have apps on their iPads which restricts usage.		
9	Ease of access to internet for children's independence	Internet connection and speed, clearer focus as a school on apps so children get used to apps more quickly, even across specialisms would be better as everyone is using so many different ones all at the same time. Time to train children on using the apps can sometimes take away from the subjects learning objective.	Engaging for all children and promotes the need for independence towards their learning, an area that needs to be improved across the school.	CPD for all members of staff (Teachers and LAs) so everyone is on board and no one feels overwhelmed with the growing use of technology in the classroom.
10			saving paper and flexibility	Screen time worries from parents and some teachers
11	Children can be independent and teachers can communicate with them instantly	School Wifi is not always strong enough	Children are enthusiastic and excited to use it. It helps children build independence in their learning.	Issues with WiFi speed and internet connection.
12	Children being able to independently work on tasks at their own pace, allowing children to take more ownership of their learning. Accessing a range of ways to teach different concepts in a more engaging way.	WiFi speed, software updates, battery life & apps.		
13	Children being independent in their learning through BYOD device	Takes away skills or writing		
14	Children are able to research and work at different tasks independently and at their own pace. Different programs promote engagement in different areas that can sometimes be less enjoyable to learn. There is no issue of being able to use the equipment as they have their own. It is not 'booked out.'	WiFi speed and storage on I-Pads. Ch with older versions of I-Pads which cannot handle the new software as well. Glitches e.g. recently, we have uploaded homework books as an I-book. Many of the children have found that the I-Pad 'kicks them out' after viewing a few pages.	Learning skills needed for secondary school and later life	Cyberbullying and parents
15	Children are enthusiastic and excited to use IPads within classrooms. They are keen to show off skills and teach others.	Children being prepared with charged IPads and updated apps. They can sometimes come in with broken IPads that should be repaired in their own time.	Enabling student Independence and development of 21 Century learning values	Teacher training and leadership

Appendix H: Total numbers of staff in agreement with survey statements



List of Figures and Tables

Figures

Tables

[i] In order to weigh potential risks against benefits, the researcher first needs to plan and clearly articulate all of the following that apply:
how existing data or contact information of potential participants will be obtained,
format and context of the initial contact with potential participants,
informed consent procedures,
assignment to groups (if applicable),
description of any pilot activities,
data collection steps,
transcript review and/or member check (if applicable), and
how results will be shared with stakeholders.

[ii] Privacy risks might include unintended breach of confidential information (such as educational or medical records); being observed/overheard by others while meeting researcher or providing data; or intrusion on the privacy of others who are not involved in the study (e.g. participant's family).

[iii] Secure data storage requires password protection on electronic files and locks for physical data.

[iv] Note that consent forms do not require signatures if the participant can indicate consent by some action such as clicking on a link, returning a completed survey, etc.

[v] Participant identities might be "indirectly" and unintentionally disclosed if a researcher's final research report fails to with hold demographic details or site descriptions that might permit a reader to deduce the identity of a participant. So the researcher needs to think about which demographic descriptors are most important to collect and report, while ensuring that the identity of individual participants is protected. Also, the name of the site/organization is typically masked in scholarly research though in some cases, the organization can elect to publicize their name along with the research results.

[vi] Psychological risks include stress greater than what one would experience in daily life (e.g., materials or topics that could be considered sensitive, offensive, threatening, degrading).

[vii] Relationship risks are present if the recruitment or data collection process are likely to alter the existing dynamics between the researcher and participant (who may be coworkers or have some professional relationship), among participants (if they know one another), or between the participant and the participant's friends, coworkers, or family members.

[viii] Legal risks are present if data collection might result in a participant's disclosure of violation of laws.

[ix] Economic/professional risks are present if data collection could result in the participant disclosing violation of workplace policies, disagreement with leadership decisions, poor work performance, or anything else that could be damaging to the participant's position, professional reputation, promotability, or employability. Risks are acceptable but participants need to be made aware of professional risks during the consent process so they can make an informed decision.

[x] Physical risks are not common in social science research but would involve risk of serious physical injury to the participant or the researcher.

[xi] Minimal risks are acceptable but must be identified upfront. Minimal risk is defined as when: "the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life."

[xii] The researcher is responsible for planning measures that will provide participants with reasonable protection from privacy loss, distress, psychological harm, economic loss, damage to professional reputation, and other possible harms.

[xiii] A conflict of interest is caused when the researcher has some sort of dual role in the research context, such as being a teacher, therapist, investor, business-owner, manager, etc. Conflict of interest must be managed to ensure that the research reveals "truth," not just the outcome that the researcher might desire to see due to their other role.

[xiv] All research activities place some degree of burden on the participants by asking the participants to share personal information, volunteer time, and assume risks.

[xv] Examples of "new knowledge" include: effectively addressing a gap in the literature, generating new theory, enhancing understanding of a phenomenon, assessing effectiveness of a particular professional practice, addressing a local practical problem via data analysis.

[xvi] No documentation of permission is required (a) if the researcher will simply be asking organizations to distribute research invitations on the researcher's behalf, or (b) if the researcher is using only public means to identify/contact participants.

[xvii] **Note that when medical, educational, or business records would be analyzed or used to identify potential research participants, the site needs to explicitly approve access to data for research purposes (even if the researcher normally has access to that data to perform his or her job).**

[xviii] Researchers must be able to document their training in the data collection techniques and the ethics committee might require the researcher to obtain additional training prior to ethics approval. For most student researchers, the research course sequence is sufficient but some research procedures (such as interviewing people with mental disabilities) may require additional training. For psychological assessments, the manual indicates specific qualifications required. Data collection from children requires a background check/clearance through a local agency.

[xix] Remote supervision is suitable for most studies but onsite supervision may be required for certain types of sensitive data collection (e.g., interviews or assessment regarding emotional topics).

[xx] For example, anonymous surveys and/or low-pressure communications such as email invitations permit potential participants to opt out with minimal fear of retaliation or other negative consequences.

[xxi] It is not ethically acceptable to invite a "captive audience" to participate in research on the spot (i.e., to ask an entire class or a group of meeting attendees to complete a survey during their session). Such a dynamic would not provide sufficient privacy or respect for their right to decline research participation. However, a researcher may use the last few minutes of a meeting to introduce a study and distribute materials, such that the potential participants can then take their time to decide later about participation.

[xxii] Generally, data collection cannot be approved during work hours or school hours unless a "free period" has been identified (e.g., lunch) so the research activities can be separated from the participants' regular activities. It is important to maintain an "opt in" dynamic rather than implying that employees/students/group members are expected to participate.

[xxiii] **Completion of the study directly benefits the student (allowing him or her to obtain a degree), and so the researcher should minimize the potential for either (a) conflict of interest or (b) perceived coercion to participate. Researchers who are in positions of authority or familiarity must take extra precautions to ensure that potential participants are not pressured to take part in their study. Examples: an instructor researcher may recruit her students AFTER grades have been assigned; a psychologist researcher may recruit clients from ANOTHER psychologist's practice; a manager researcher may conduct ANONYMOUS data collection so that subordinates do not perceive their responses or [non]participation as being associated with their job standing.**

[xxiv] When applicable, the exclusion criteria should be listed on the recruitment material (flyer, invitation email,etc.) or participant information sheet (PIS) to prevent situations in which the researcher rejects volunteers in a stigmatizing manner.

[xxv] Informed consent is not just a form; it is a process of explaining the study to the participant and encouraging questions before the participant makes a decision about participation.

[xxvi] While documenting consent via signature is common, note that anonymous surveys can obtain "implied consent" by informing the participant, "To protect your privacy, no consent signature is requested. Instead, you may indicate your consent by clicking here/returning this survey in the enclosed envelope.") It is also acceptable to audio record verbal consent for interviews, in order to not have any record of the interviewee's name.

[xxvii] The ethics committee encourages tailoring the language to the readers as long as a professional tone is maintained.

[xxviii] Minimal jargon should be used during the informed consent process. Everyday layperson language is most appropriate to help a participant make an informed decision about participation.

[xxix] People receiving the PIS should not be left wondering, "How did the researcher get my name?" or "Why am I being invited and not others?" or "Does the researcher already know private information about me?" The means by which the researcher has identified and contacted the potential participant needs to be made clear, if it is not already clear from the context. Sample explanations of inclusion criteria in PIS: (a) The human resources department has forwarded this invitation to all employees who meet the researcher's study criteria (i.e., have been with the organization at least 2 years and have transitioned into a managerial role within the past year); or (b) The researcher is inviting all attendees of the past year's XYZ professional conference to be in the study; or (c) The researcher will be randomly selecting possible participants by approaching the residents of every 5th home in this neighborhood until 100 responses are obtained.

[xxx] When the researcher is already known to the participant, the PIS must include written assurance that declining or discontinuing will not negatively impact the participant's relationship with the researcher or (if applicable) the invitee's access to services.

[xxxi] Provide an estimate (in minutes or hours) of each component of data collection (e.g., survey, interview, member checking. etc.)

[xxxii] Describe only the possible harms that go beyond the risks of daily life.

[xxxiii] For most social science studies, it is appropriate to state that there are no particular direct benefits to the individual. In this case, just present the benefits to society.

[xxxiv] The PIS should explain that the research report will not include names and that the data will not be used for any purposes other than research. It is not always clear to participants how a research interview is different from a journalistic interview, in which informants might be named. So the PIS should also describe any coding system that will permit the researcher to not use names. For sensitive interviews, the researcher might also want to assure participants that recordings will be destroyed immediately after transcription.

[xxxv] The consent forms/process should not ask a participant to waive any legal rights.

[xxxvi] Targeted recruitment of vulnerable participants can only be approved when the ethics committee determines that the study's benefits justify its risks/costs.

[xxxvii] A researcher with a dual role must use anonymous surveys or some other method that permits potential participants to opt out without fear of negative consequences. Patients, students, and subordinates of the researcher need explicit assurance that their decision about participation will in no way impact their ongoing relationship with the researcher.

[xxxviii] Any limits to confidentiality (i.e., duty to report) must be mentioned in the participant information sheet (PIS).