

A Human-Centred Approach to Investigate Learners' Motivation and the Impact of e-Learning

Laura Smith
833411

Submitted to Swansea University in partial fulfilment
of the requirements of the Degree of Master of Science



**Prifysgol Abertawe
Swansea University**

Department of Computer Science
Swansea University

30th September 2022

Declaration

This work has not been previously accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed: L.Smtih (candidate)

Date: 30/09/2022

Statement 1

This work is the result of my own independent study/investigations, except where otherwise stated. Other sources are clearly acknowledge by giving explicit references. I understand that failure to do this amounts to plagiarism and will be considered grounds for failure of this work and the degree examination as a whole.

Signed: L.Smtih (candidate)

Date: 30/09/2022

Statement 2

I hereby give my consent for my work, if accepted, to be archived and available for reference use, and for the title and summary to be made available to outside organisations.

Signed: L.Smtih (candidate)

Date: 30/09/2022

I would like to dedicate this work to Leonie, my parents and my sister. Without your constant support and encouragement, not just during this degree but my entire university career, I would not be where I am today.

Abstract

The evolution of the digital age has seen the rapid expansion of technology in the education sector. This, along with the rushed implementation of educational technology (EdTech) due to the impact of the COVID-19 pandemic means there is an ever increasing need to undertake research to understand the outcomes, both positive and negative as well as individuals' overall motivation to utilise EdTech. Therefore, this study aims to explore the motivation of teachers to utilise EdTech tools as well as their perceptions of the motivations of students to utilise these tools. This study employed a mixed-methods online questionnaire which was completed by 37 primary and secondary school teachers. Quantitative data was analysed using Pearson's correlation and open-ended qualitative data was analysed using thematic analysis. It was identified that students were perceived to lack motivation due to an inability to relate to taught content and outside influences from their social environment. Within this sample, it was found that EdTech did not provide a distraction for students. Participants also highlighted that students were perceived to be motivated to use EdTech due to enjoyment, independence, ease of use, and the interactivity provided by the platforms. As a result of these findings, prototypes have been developed to increase student motivation and include reward schemes, leaderboards, customisable avatars, and limited-edition badges to collect.

Acknowledgements

I would like to express my gratitude to my supervisors, Dr Robinson, Dr Playfoot and Dr Dix as well as the team at CENTURY, your support, guidance, and patience has been paramount to the completion of this work. It would not be possible without you.

I would also like to thank each of the participants who contributed their valuable insight to this project.

Contents

Introduction	1
1.1. Motivations	2
1.1.1. Objective.....	3
1.2. Case Study	4
1.3. Overview	4
Literature Review	5
2.1. Expansion of EdTech.....	5
2.2. Impact of COVID-19 and Government Investment	6
2.3. Impacts of EdTech	7
2.4. Motivational Theories	8
2.4.1. Valence-Instrumentality-Expectancy Model	9
2.4.2. Social Learning Theory.....	9
2.4.3. ARCS.....	9
2.4.4. Intrinsic and Extrinsic Motivation Theory.....	9
2.4.5. Flow Theory	10
2.4.6. Self-Determination Theory	10
Methods.....	12
3.1. Methodology	12
3.2. Participants.....	13
3.3. Procedure	13
3.4. Data Analysis	14
Results	17
4.1. Descriptive Statistics	17
4.2. Quantitative Results.....	20
4.3. Qualitative Results	29
4.3.1. Motivation to Use EdTech	29
4.3.1.1. Current Motivational Factors Perceived for Students	29
4.3.1.2. Additional Factors that Could Motivate Students	31
4.3.2. Impact of EdTech	32
4.3.2.1. Positive Aspects	32
4.3.2.2. Negative Aspects.....	33
4.3.3. EdTech Features.....	34
4.3.3.1. Useful Features for Students	34
4.3.3.2. Useful Features for Teachers	35

Discussion.....	36
5.1. PSM	36
5.2. Qualitative Discussion	38
5.2.1. Prototypes.....	39
5.2.1.1. Prototype One: Points and Leaderboards	40
5.2.1.2. Prototype Two: Customisation	41
5.2.1.3. Prototype Three: Badges	42
Conclusion.....	44
6.1. Summary	44
6.2. Strengths and Limitations	44
6.3. Future Directions.....	45
Bibliography.....	46
Appendix.....	56

Chapter 1

Introduction

The evolution of the digital age has seen rapid changes in the capabilities and applications of technology, with expansions in mobile commerce, smartphone technology and social media [14]. This has led to mobile technologies including smartphones, laptops, and tablets becoming increasingly popular, particularly among younger generations [66]. As a result of these capabilities and popularity of devices, it was identified in 2018 that 95% of American adults owned a mobile phone, with half of these suggesting they could not live life without one. Furthermore, 20% of internet users indicated they are online almost constantly and 75% are online at least once per day [68]. This constant access to technology has had a significant impact on the behaviours of society, particularly in the ways in which we communicate and retrieve information [70]. These factors resulted in the suggestion that technology should play a role in education. There is argument for this case with the expansion of connectivity and information afforded by changes in technology leading to broader and far-reaching social networks and collaborations along with immediate access to endless information. These opportunities can be utilised to not only prepare students for future work in technology infused careers but also as a way to connect and collaborate with others across the world [82].

Educational technology (EdTech) is “the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources” [45]. To this effect, EdTech utilises emerging technologies to improve learning experiences and has evolved from audio-visual aids and computers to mobile and smart technologies, virtual reality, cloud computing, and wearable devices [42]. EdTech is utilised within classroom settings as a means to support traditional teaching by making broader and high-quality ranges of information readily accessible, resulting in greater levels of knowledge for those willing to learn [27]. Beyond this, implementing EdTech within schools will give students the opportunity to develop their competence and confidence in using technologies. This will equip them for future working environments, particularly in sectors such as business and industry, in which they will likely need knowledge and skills of ICT literacy [20].

Furthermore, there has been a rapid shift into online learning using EdTech tools in order to mitigate the negative impacts of the COVID-19 pandemic and to ensure continuity in learning [83]. Consequently, it is now more vital than ever to understand the impact EdTech can have on learning and the support provided or harm inflicted by these tools within the education field. It has been reported that the COVID-19 pandemic will act as a catalyst for the transformation of education with long-term development and digitalisation of the sector. It is also noted that a wide range of educational institutions and companies are examining the feasibility and developing solutions for the use of EdTech to support learning [69].

Research has shown that motivation is a key factor in engaging students to learn and attain higher levels of academic performance. When students are sufficiently motivated, they are more likely to approach challenging tasks or difficult situations with confidence, persistence, and enjoyment. If a student also perceives themselves to be autonomous and to experience self-determination when undertaking a challenging task, they are recognised to be more motivated to learn and complete tasks [55].

1.1. Motivations

With the expansion of technology into the education field, it is important to understand the positive and negative impacts it can have on people's lives. EdTech research should, therefore, be used to inform the development and implementation of these tools to create meaningful and sage impacts for learners [71].

There is a gap within EdTech literature leading to difficulty in finding reliable and up-to-date information regarding current trends in the field. Beyond the literature, there is also sometimes a noted disconnect between research and practice, in which research findings have not been tried and tested by EdTech companies, and researchers have not recognised the findings of EdTech companies [22]. Further to this, EdTech is often treated as a separate or supplementary after school activity instead of a tool that can be utilised to support traditional teaching [29]. Moreover, there have been a large number of stated impacts attributed to EdTech which do not appear to have come to fruition. This has led to the hype surrounding EdTech to exceed the assessment of its capabilities and impacts [36].

There has been a push for the implementation of EdTech within schools, particularly as a result of the COVID-19 pandemic as well as extensive government investments [80]. The

COVID-19 pandemic led to the rushed need to move almost all teaching to remote, online learning across the world [80]. Furthermore, the extensive investment in EdTech put forward by policymakers can result in the focus being on return on investment instead of the intended positive outcomes for end-users [28]. The push for technology and lack of appropriate interest in the impact of EdTech from those benefiting from such events as the COVID-19 pandemic means it is vital to undertake EdTech research which will highlight the best steps to take to produce the most meaningful and positive outcomes for learners [91].

Moreover, much of the research that has been conducted has been small-scale with limited participant numbers, demographics, budgets, and timescales. This reduces the generalisability of research outcomes [47]. In particular, limited studies have been conducted to gain a teachers' perspective of EdTech which can further add to the disconnect between research and practice. Teachers play a significant role in utilising EdTech within classroom settings, especially in relation to motivating students to use such applications [33]. Therefore, it is important that research conducted with this participant group is undertaken to gain their understanding of students' motivation to use EdTech platforms.

1.1.1. Objective

Despite the substantial growth of technology, in recent years there has been a widespread push to utilise EdTech platforms within an education setting. This is due to the unprecedented impact of COVID-19. As a result, many institutions and EdTech providers have swiftly promoted solutions to ensure the continuation of teaching and learning. This rush to implement EdTech solutions may not reflect the best pedagogical practice or consider the needs or motivations of its end users [80]. It is therefore important to understand motivations to utilise these platforms and develop solutions to enhance user experience and overall learning outcomes.

In order to achieve these objectives, this study aims to:

- i) Explore the motivation of teachers to utilise EdTech tools
- ii) Understand students' motivation to use EdTech tools from the perspective of teachers
- iii) Develop ideas for EdTech prototypes that can be implemented in future works

1.2. Case Study

As part of this project, CENTURY are involved as a stakeholder. CENTURY are an EdTech company with an interest in understanding the motivation of learners when using EdTech tools. The synergy and working partnership between the researchers and CENTURY can provide a range of mutual benefits including access to a developed and deployed EdTech platform, in-depth research regarding the motivation of learners, and the development of EdTech prototypes which can be utilised to improve user experiences. Furthermore, the involvement of CENTURY in this project can allow for the exchange of ideas, knowledge and expertise that will strengthen the outcomes of this project, the research undertaken and the implementation of EdTech for learners.

1.3. Overview

Chapter 1 of this thesis focuses on the context of the project, introduces the research aims and objectives as well as highlights the contribution of this project to extant literature.

In Chapter 2, the extant literature is reviewed, concentrating on the EdTech field and motivational theories, particularly relating to education.

Chapter 3 describes the methods utilised to undertake this study, as well as the participant demographics and recruitment procedure. The data analysis process, methodological rigour and human-centred approach are then discussed.

Chapter 4 outlines the findings from the participants including the teachers' perspectives of students' motivation and lack of motivation to learn using EdTech, along with the impact these tools can have on such factors as academic performance.

In Chapter 5, the results are discussed and explained using contemporary literature and prototypes are developed based on participant findings.

Finally, in Chapter 6, a summary of the project is given with an outline of the applied implications. Following this, the strengths, limitations, and future directions of the project are discussed.

Chapter 2

Literature Review

This chapter aims to critically review the research that has been undertaken on EdTech and learner motivation. This is done by discussing key academic literature within the area of EdTech, particularly when used within primary and secondary schools. Lastly, a range of motivational theories in the context of educational settings are discussed.

2.1. Expansion of EdTech

The role of technology in education can be traced back centuries with the development of the first tools. However, EdTech as we know it today, particularly the role of computer-based learning, began to develop in the 1950s. This included an assessment of machines which utilised programmed learning without the intervention of humans to structure information, test knowledge and provide feedback [10]. In the 1980s, computer networks were developed and tested in a large-scale online university course which allowed students and instructors to communicate. By the 1990s, online learning environments were developed, enabling learning management systems that provided online teaching environments including spaces for activities, discussions, and learning objectives. By the late 2000s, education technology had further expanded to Massive Open Online Courses (MOOC) known as connectivism, where individuals could use online tools to participate in richer learning environments [10].

Nowadays, EdTech is considered to combine three concepts including visual instruction, personalised systems, and systematic methods of evaluation [4] built into devices such as mobile and smart-technologies, virtual reality devices, and immersive environments. There is an increasing demand for EdTech on a global scale which has led to many stakeholders attempting to develop technologies that exceed the quality of traditional teaching. These technologies have a range of capabilities and activities that aim to nurture motivation and engagement in learning in an efficient and effective way. In order to do this, many companies are attempting to employ experts that have specialist knowledge to develop this technology. However, it has been noted to be difficult to find suitable individuals, resulting in high demand for those well versed in both the technology and education fields [42]. Accordingly, this lack of suitably qualified individuals has resulted in the development of innovative technology

without explicit application in the education sector [89] leading to these tools falling noticeably behind the research being conducted in other educational areas such as academic performance and learning outcomes [71]. [4] also highlights that the rapid expansion of the technology industry, particularly when discussing its potential within the education sector, has been extensively promoted but underutilised. As a consequence, EdTech often falls short in terms of the outcomes it produces.

2.2. Impact of COVID-19 and Government Investment

To add to the reduced understanding and impact of EdTech outcomes, the COVID-19 pandemic called for an emergency push to utilise EdTech across the world. The discovery of the novel coronavirus: SARS-Cov2 in 2019, and the subsequent rapid spread of the respiratory disease across the world in 2020, had many devastating effects. To limit the spread of the disease, it was recommended that people follow social distancing and isolation measures along with many other guidelines. By April 2020, following this rule, more than 3.4 billion people were in lockdown [58]. The impact of COVID-19 was especially experienced within education settings across the world. The implemented lockdowns meant that approximately 1.6 billion learners in over 200 countries were impacted by closures to schools, institutions and learning centres. This equated to 94% of the world's student population [65]. These closures and lack of face-to-face contact meant that traditional teaching had to be adapted and moved to online platforms, making EdTech an important asset during this period [49]. Despite COVID-19 paving the way for EdTech including stakeholders providing technology resources to alleviate the strain on the education sector, it is clear that others in the EdTech industry used the pandemic as a business opportunity to push themselves ahead in the EdTech market and further their income [90].

Along with companies, governments have an invested interest in EdTech, with many countries developing policies which integrate the use of EdTech in the education system. The policies surrounding the use of EdTech have been described as diverse, hybrid and unstable and are being continuously adapted and are evolving with the expansion of the sector [64]. In spite of this, many of these policies specifically highlight the goal of using EdTech to improve the education system as well as outlining the need for resources such as funding, equipment, network infrastructure, and continuing professional development for teachers [26]. Despite the many opportunities afforded by EdTech, some students lack the resources and access to EdTech to engage with online education, leading to a higher risk of falling behind in the

curriculum and their learning [74]. To combat this challenge, many policymakers are prioritising a commitment to improve EdTech within schools. This includes an investment of over £160m by the Welsh Government to support and transform the education sector by providing easy access to equipment and resources in Wales to facilitate learning. This funding has enabled the purchase of over 185,000 new devices to allow schools to meet the ever-growing desire for EdTech in the classrooms [43]. This investment is made with the assumption that EdTech can lead to improved academic performance and learning outcomes [40]. However, the solutions to necessary EdTech implementations are new measures, meaning they are relatively untested and often inconsistent across institutions [87].

2.3. Impacts of EdTech

It is suggested that EdTech can act as the primary factor in the enhancement of students' motivation to improve their academic performance. There are a number of additional factors relating to EdTech that can increase a user's intrinsic motivation including ease of use, curiosity towards new learning tools, and psychological satisfaction [62]. According to [62], EdTech can enhance students' motivation, attention, determination, and attitude toward education. This is particularly found when students are adequately challenged using EdTech, leading to heightened levels of intrinsic motivation and a desire to improve upon their previous academic achievements. Research indicates that students that utilise technology in their learning have greater levels of motivation and concentration, allowing students to achieve better academic outputs [12]. In a study conducted by [26], it was found that 88% of headteachers and 84% of teachers perceived EdTech to contribute to pupil attainment and that the implementation of EdTech would improve in-class teaching. However, a number of barriers to the use of EdTech for remote learning were highlighted. These include students' access to digital services, broadband or connectivity issues, parents' or students' digital skills and the associated cost. A key benefit of the utilisation of EdTech is the ability to personalise users learning experiences including user preferences and abilities. This personalisation has been shown to have a moderately positive impact on outcomes in literacy and mathematics [39]. EdTech can enable a learner centred environment which allows educators to upgrade their teaching by integrating new interactive tools [57]. Again, the facilitation of personalised learning environments within the education setting can increase student engagement. Tools such as robots, AR and virtual classrooms can create a more inclusive and livelier classroom setting that fosters inquisitiveness in students [3]. Additionally, the use of EdTech enables teachers to collect data

on student engagement and performance automatically, allowing teachers to see who is struggling a lot faster than without the use of EdTech [38]. Utilising EdTech platforms in learning provides students with easily accessible information and allows for accelerated learning, especially in STEM subjects as technology allows for interactive models and AR based learning tools. EdTech allows for personalised learning outcomes, which enables children to learn at their own pace. This is not only beneficial to students who may need extra time to grasp a new subject but also to students who learn quickly and become bored with the repetitive nature of traditional teaching, which then leads to them becoming restless and disturbing the lessons. With the addition of EdTech to the normal classroom setting, students who finish tasks quicker or understand new topics faster can further their knowledge easily by completing extra work, quizzes, and puzzles via the use of EdTech while the rest of the class can follow the teacher's instructions [3]. However, despite all the benefits of EdTech, these tools should always be seen as an addition to traditional teaching, not as a substitute for teachers [38].

2.4. Motivational Theories

Perhaps the most important question when researching EdTech is what motivates students to utilise these tools to support their learning. Understanding this motivational factor may provide insight into the reasons for learning outcomes [67]. Motivation is a concept consisting of internal factors that urge for action and external factors that can induce actions. Motivation can affect an individual's choice to complete an action as well as how much effort and persistence the task requires to be completed. Motivation plays a key role in acquiring new skills and abilities [56], which makes motivation one of the most important factors for learning [52, 78]. Since the 1930s, a variety of theories around motivation have emerged within the field of psychology [56]. Researchers found that tightly structured curriculums do not allow students to learn at their own pace or pursue topics that interest them. This can act as a deterrent to their natural curiosity and ability to participate in self-directed learning [78]. Student cohorts are usually a mix of highly motivated students, who do not expect external rewards for their participation [77] and students who exhibit low levels of motivation and need encouragement through rewards [78]. A number of motivational theories have been developed over the years in relation to education.

2.4.1. Valence-Instrumentality-Expectancy Model

The valence-instrumentality-expectancy model was developed by [88]. This was the first hedonistically motivated overarching theory behind motivation. This theory states that individuals should be motivated by feelings of satisfaction. Within an educational context, expectancy theory assumes that students can be motivated to reach their goals if they perceive this to have a favourable outcome. This could include the belief that their effort will lead to better academic performance [11].

2.4.2. Social Learning Theory

Another motivational theory is social learning theory [8] which proposes that the core motivational factors to learning are the social context in which the learning occurs. This theory focuses on the dynamic and reciprocal interactions of people, environment, and behaviour [59]. There are four concepts to social cognitive theory: goals, outcome expectancies, self-efficacy, and socio-structural variables [7, 8]. Applying social learning theory to educational settings would be done through positive modelling and reinforcement of the desired behaviours. For example, praising students who complete assignments on time to encourage other students to imitate these behaviours.

2.4.3. ARCS

The ARCS model, which is based on four components of motivation including attention, reliance, confidence, and satisfaction, aims to increase the motivational feature of teaching materials as well as in technology-based learning environments [48]. Through this model, the attention component encourages curiosity; relevance incorporates a student's experiences, goals and perceptions of the learning process; confidence enhances a student's belief that they will achieve their desired goals, and the satisfaction component allows the student to evaluate feedback in accordance with the learning process. If these four components are satisfied, it is suggested students will be motivated to learn [32].

2.4.4. Intrinsic and Extrinsic Motivation Theory

Intrinsic and extrinsic theory is based on two types of motivational stimuli within the student. Intrinsic motivation stems from a sense of satisfaction, interest, or enjoyment when completing an activity. In particular, intrinsically motivated students believe their achievements are a result of them being effective agents who are in control of the factors surrounding their success such as the effort they expend studying. High levels of intrinsic

motivation are associated with successful academic achievement and enjoyment [81]. This form of motivation does not require any external rewards [72]. Opposingly, extrinsic motivation is solely driven by rewards, such as recognition from the teacher or achieving higher grades than their peers [44]. Although this form of motivation is not effective in the longer term, it has been noted that extrinsic motivation can be used as a starting point in which to transform into intrinsic motivation as reward systems lose their novelty [78]. Both intrinsic and extrinsic motivation go hand in hand, with extrinsic measures giving an initial boost to students to being their learning [53].

2.4.5. Flow Theory

One motivational theory focused specifically on intrinsic motivation is flow theory [21]. According to [21], individuals will be intrinsically motivated when they experience a state of flow during the completion of a task. To achieve this state of flow, challenges experienced must equal skills possessed such that an individual must engage with tasks that are appropriately challenging and ensure one's skills are neither exceeded nor underutilised. Achieving this state of flow and the subsequent self-motivated learning experienced is considered the best way to learn and achieve positive academic outcomes [54].

2.4.6. Self-Determination Theory

Finally, self-determination theory (SDT) indicates that an individual is motivated to grow if three basic psychological needs are met. These needs include competence, relatedness, and autonomy. To feel competent, an individual must develop skills to gain mastery of a task. The development of these skills is likely to result in an increased capability to achieve goals. In order to experience relatedness, individuals need to feel a sense of belonging, for instance being part of a team with their classmates. Autonomy is achieved when an individual feels in control of their behaviours and goals. If these needs are met, individuals are likely to experience self-determination and intrinsic motivation [24]. Within an educational setting, the experience of this motivation can be achieved by gaining knowledge and mastery over a challenge. Examining self-determination theory has shown that autonomous motivation leads to more positive outcomes than motivation that has been controlled [35]. This finding poses difficulties in adapting motivational measures to educational settings as intrinsic motivation cannot be prompted but has to come from within the student.

Considering a variety of recommendations from differing social cognitive theories has allowed for the development of a list of prompts for teachers. For example, academic activities

should be personally meaningful and relevant to the students, assignments should be moderately challenging, students should be allowed to make their own choices about their classroom experience and what work they would like to engage in, students should be encouraged to focus on skill development without worrying about test scores, the curriculum should always be novel, and feedback should be informational and aimed at competence development [46].

Chapter 3

Methods

This chapter discusses the methods used to gain an understanding of the factors that impact students' motivation to use EdTech tools from the perspective of their teachers. Following this, the participant selection criteria is outlined, and the recruitment procedure described. Subsequently, the data collection and analysis processes are detailed. Finally, the methodological rigour and human-centred approach of the study are discussed.

3.1. Methodology

This study aims to understand learners' motivation and the impact of EdTech. This study was a voluntary online survey utilising a mixed-methods questionnaire, combining quantitative and qualitative questions and data analysis to gain teachers' perceptions of students' motivation to use EdTech tools. Specifically, the developed questionnaire contained both open-ended and closed-ended questions. This form of data collection can provide a deep understanding of the topic of interest including attitudes, feelings, and knowledge [50].

The developed questionnaire can be divided into three sections. The first section was a demographics section which aimed to gain an understanding of the teachers and the EdTech tools they utilise. The second section focuses on perceptions of student engagement and impacts of EdTech tools as well as which EdTech features are beneficial or need improvement. The final section seeks to understand teachers' perceptions of student motivation towards the use of EdTech by asking four open-ended questions as well as utilising the perceived motivation of students (PSM) questionnaire which was developed to assess teachers' perceptions of student motivation. The PSM was adapted from [37] to specifically fit the EdTech focus of this research. The PSM can be divided into two subscales: 1) student motivation, and 2) reasons for students' lack of motivation. Overall, the PSM consists of 20 statements and has been validated across two samples, one based in the US and one in East Asia. Both of these samples have shown acceptable reliability with Cronbach's alpha being .90 and .89 for the motivation subscale and .77 and .80 for the reasons subscale in the US and East Asian samples respectively [37]. These Cronbach's alpha scores show that there is relatively high internal consistency of the scales, which makes the PSM a reliable tool to use [85]. To

ensure the PSM questions within this study related specifically to EdTech, the seven statements on the motivational subscale were adapted from focusing on the classroom in general to EdTech specifically. For example, the original statement of “my students work at learning new things in this class” was adapted to “my students work at learning new things using EdTech.” The reason subscale consists of 13 statements and required no adaptations. All statements are scored on a 4-point Likert scale with answers ranging from 1 = “not at all true” to 4 = “very much true” (see Appendix 1 for the full questionnaire).

There are a range of advantages to conducting questionnaires in research including they are less time consuming than other methods such as interviews, often receive higher rates of participation, easy to complete, low or no cost, and provide flexibility in administration, distribution, and completion. The completion of questionnaires can be done when convenient to the participants and at their own pace. Finally, questionnaires can reduce any social bias as participants will be less likely to provide information they believe the researcher would want to hear [6]. Another particularly important factor afforded by the use of questionnaires is the anonymity and confidentiality provided which can lead to more open and honest feedback from participants [9].

3.2. Participants

37 primary and secondary school teachers were recruited via social media, email, and personal connections. The participant inclusion criteria for this study were any primary or secondary school teacher that utilised EdTech within their teaching. Through purposive sampling, these participants were selected to participate in the research due to their unique perspective on the use of EdTech within the classroom as well as students’ motivation for using EdTech to assist their learning. As a result of the experience of this participant group, detailed knowledge and insight could be provided to address the research aims of this study [19].

3.3. Procedure

Ethical approval (SU-Ethics-Student-200722/5541) was granted by Swansea University’s Faculty of Science and Engineering Ethics Committee. Following ethical approval, 44 primary schools and 8 secondary schools were contacted via email. An introduction to the study was provided and the schools were asked if their teachers could complete the online questionnaire regarding motivation to use EdTech. Along with this, the researcher's personal and professional network was utilised to recruit participants. This

included asking friends, family and previous colleagues who are teachers to participate in the study. Each of these personal connections was contacted via face-to-face interaction, text message, WhatsApp, or Facebook messenger. The participants were provided with an overview of the study, an information sheet, and a link to the questionnaire. Furthermore, information about the study, along with a questionnaire link, was shared via social media and networking platforms Facebook and LinkedIn to extend the visibility of the study. Snowball sampling [35] was further utilised to recruit other teachers. Through snowball sampling, teachers already known to the researcher were asked to assist in the recruitment of further participants by providing contact details for other teachers or by sharing the details and questionnaire link of the study via their online platforms or with their teaching network.

Each of the participants received an information sheet (Appendix 1) attached to the online questionnaire that they could read prior to the commencement of the questionnaire. This allowed all participants to make an informed decision as to whether they would be willing to participate in the study. Participants were informed that their participation was voluntary, and they could withdraw from the survey prior to completion. Although no identifiable data was collected, participants were informed their participation in the study would be kept anonymous. Participants were asked to complete 23 questions overall. All collected data was also secured on a password-protected computer. Following the completion of the questionnaire, participants were given a debrief form to thank them for their participation and explain the purpose of the research and their participation.

3.4. Data Analysis

Quantitative analysis, conducted through SPSS23, was performed on two parts of the questionnaire, the demographics section and the PSM. Statements 5 and 6 of the PSM, “the students don’t put much effort into content taught using EdTech” and “my students are often distracted or off task when using EdTech” were reverse scored to fit with the initial scoring of the PSM. The newly recoded variables were scored accordingly, 1 = “very much true” and 4 = “not at all true”. Summary variables with the mean scores for both subscales of the PSM were created to conduct a Pearson’s correlation to show if student motivation is generally related to outside factors. Following a significant result, a full correlations table was generated to allow for further in-depth analysis of which factors are related to each other and allow for the formation of theories around the influences of home life, own aspirations, or peer pressure.

Each of the qualitative questions were analysed using reflexive thematic analysis to identify themes and patterns within participants' experiences, perspectives, and behaviours [17]. Thematic analysis follows six key phases: i) familiarisation with the data; ii) generation of initial codes; iii) generation of themes; iv) review of themes; v) defining and naming themes, and vi) writing the report. This is a repetitive process in which each phase of analysis is re-examined when needed [15].

Following the key phases of thematic analysis, the researcher became immersed in the data by reading and re-reading the qualitative data collected to ensure there was a deep understanding of the data. Initial notes were made when reading the data of any ideas, concepts, or patterns that could provide insight into the motivation to use EdTech. Some of the initial notes made included ideas such as 'students like the independence afforded by EdTech' and 'interactive and engaging content better for knowledge retention'. Once the researcher was familiar with the data, codes were developed with meaningful labels associated with the content of the data [16]. These codes were then reviewed and patterns between codes were identified to create key themes. Each of these themes were viewed as candidate themes and could subsequently be altered or removed to best represent the data. The candidate themes were reviewed to ensure each theme was substantial, represented the data adequately, and provided a useful insight into the data and the research question [18]. Once the themes were reviewed and deemed to accurately represent the data, each theme and sub-theme were given a descriptive name that captured the extent of the content within the theme. Finally, once these themes were finalised, the writing of the report began [16].

3.5. Methodological Rigour

To ensure methodological rigour within this study, a number of factors were considered. First, a pilot questionnaire was completed with a teacher. Conducting pilot studies allows researchers to pre-test research instruments and gain feedback which can be taken forward to improve and refine the data collection [17]. For this study, some of the questions were altered or removed to ensure the questions were clear and open-ended to prompt detailed responses. The participant sample selected provided different experiences and perspectives of perceptions of student motivation to use EdTech. An extensive literature review was also undertaken to gain an understanding of previous research within the EdTech and motivation fields. These findings were then utilised to guide this research [16]. Furthermore, three

supervisors and two stakeholders acted as critical friends throughout this research and with whom themes within the data and interpretations of the results were challenges [15].

Chapter 4

Results

The results chapter presents descriptive statistics relating to the participants including year group and subject they teach, EdTech applications used and frequency of use. Following this, Pearson’s correlation of the PSM is presented. Finally, the factors perceived to impact students’ motivation to use EdTech are highlighted.

4.1. Descriptive Statistics

Demographic data was collected from the participants including year group and subject taught (Figures 4.1 and 4.2).

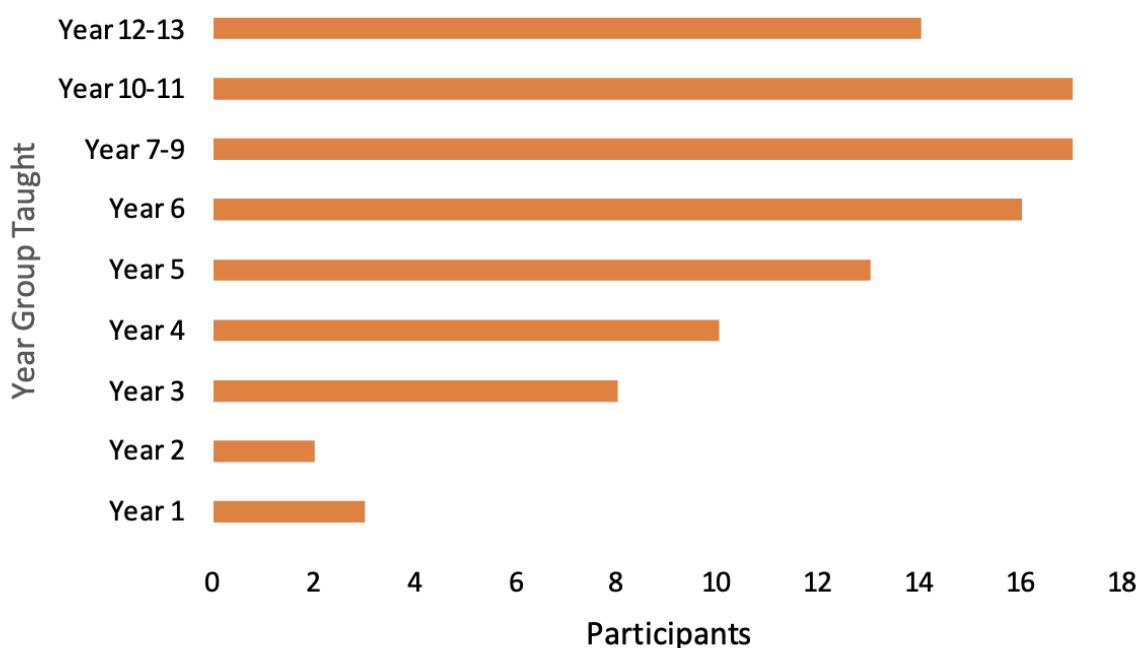


Figure 4.1: Year Group Taught

As demonstrated in Figure 4.1, the participants teach across each key stage of education, with the majority focused on years 6-11. It should also be noted that the majority of participants taught more than one year group.

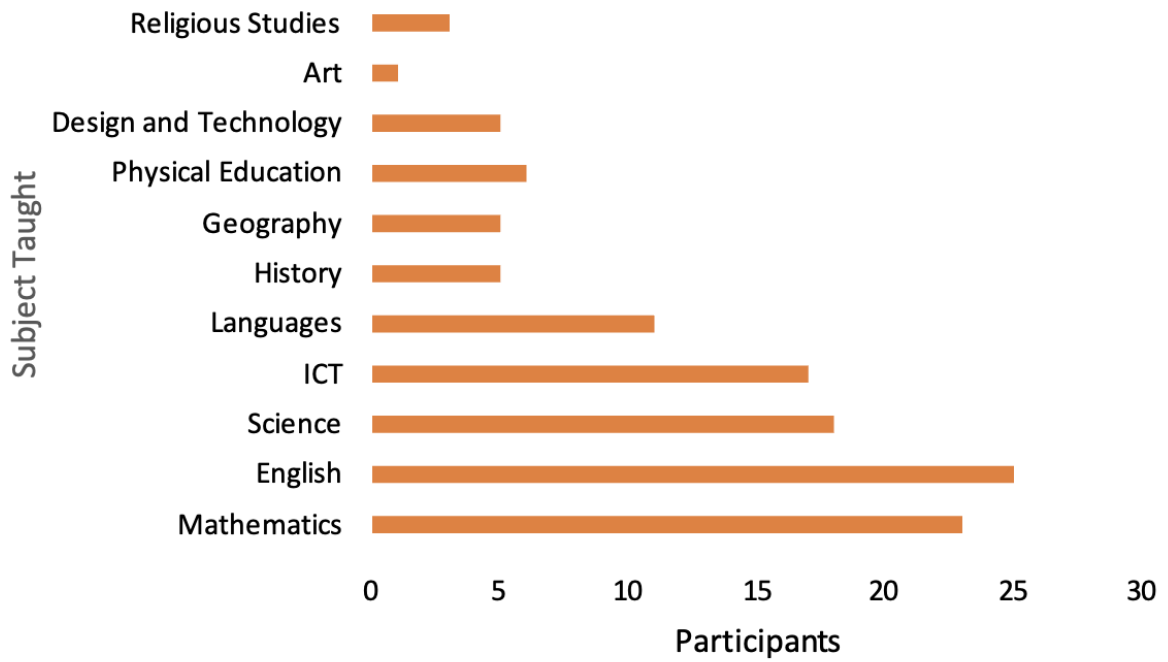


Figure 4.2: Subject Taught

Figure 4.2 shows the range of subject's participants taught utilising EdTech tools. A large majority of participants used these tools for core subjects including English, Mathematics, and Science. Again, many of the participants used EdTech for more than one subject.

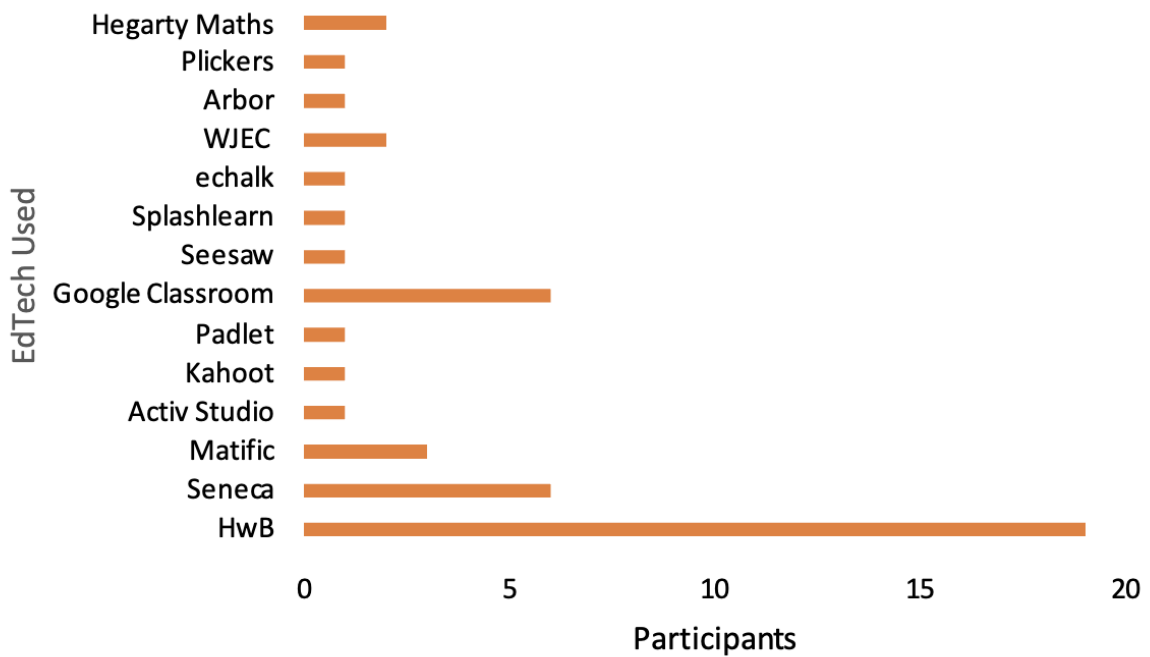


Figure 4.3: EdTech Used

As shown in Figure 4.3, more than half of the participants utilise the EdTech platform HwB, with a smaller number using Seneca, Matific, and Google Classroom.

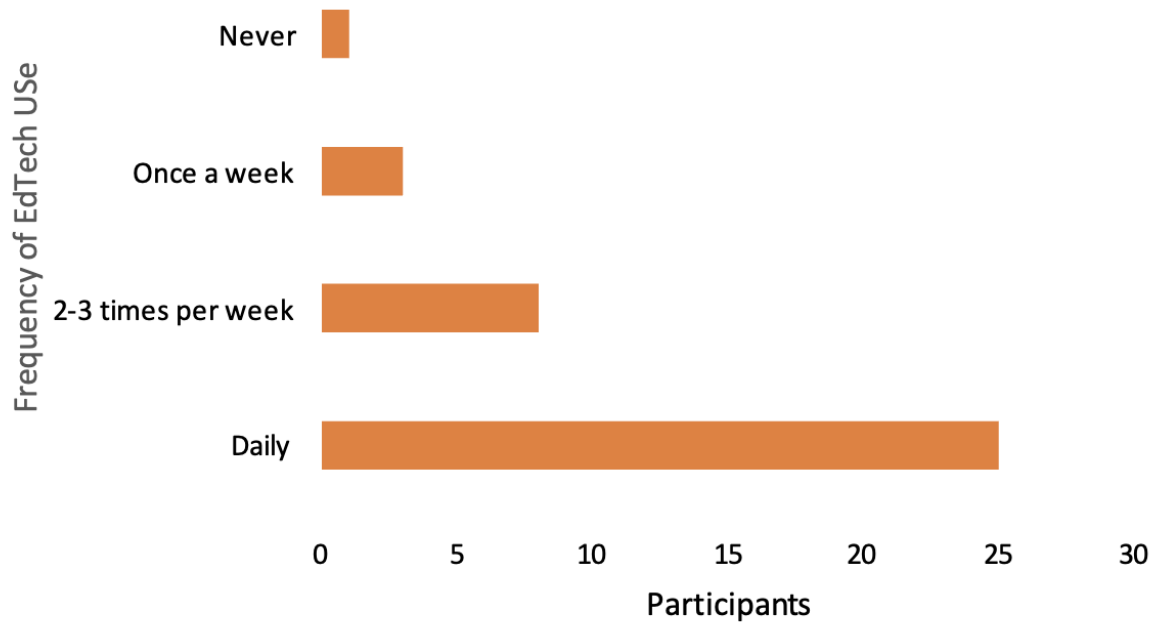


Figure 4.4: Frequency of Student EdTech Use

Participants were asked how often their students engage in EdTech, with the majority indicating daily use at the request of the teacher. Beyond this, it was highlighted that students also engage weekly in EdTech for the purpose of self-learning as EdTech can be motivating and many students will choose to access and use it continually in their own time. It was also mentioned that older students, especially those revising and preparing for exams, will utilise EdTech more often than younger students.

4.2. Quantitative Results

Correlations

		Mean Perceived Motivation	Mean Reasons for lack of motivation
Mean Perceived Motivation	Pearson Correlation	1	-.543**
	Sig. (2-tailed)		<.001
	N	37	37
Mean Reasons for lack of motivation	Pearson Correlation	-.543**	1
	Sig. (2-tailed)	<.001	
	N	37	37

** . Correlation is significant at the 0.01 level (2-tailed).

A Pearson's correlation was run on the motivation and reasons for lack of motivation mean variables, revealing that student motivation was strongly negatively correlated with reasons for lacking motivation, $r(35) = -.543$, $p < .001$.

The above correlation is very strong as the r value is greater than .5 (see Cohen, 1988). This shows that the higher the reasons for the lack of motivation within students were the lower their motivation.

Correlations

		...try to learn using EdTech.	...learning new things using EdTech.	...focus on assignments taught using EdTech.	...complete assignments and tasks that have been set using EdTech.	...don't put much effort into content taught using EdTech.	...often distracted or off task when using EdTech.	...interested in learning via EdTech tools.	...parents don't care about or value education.	...don't see the value of what they are being asked to learn.	...don't have aspirations that connect to education.	...don't see the content, then...	...too many home problems to make school a priority.	...don't see the relevance of the content in their futures they see for themselves.	...education has devalue school.	...they don't see how useful this information can be.	Negative peer pressure is one big reason...	...because they are just lazy.	...just don't care about learning-period.		
...try to learn using EdTech.	Pearson Correlation	1	.813**	.808**	.521**	.539**	.268	.678**	-.070	-.259	-.534**	-.304	-.073	-.253	-.279	-.396*	-.390*	-.278	-.294	-.129	-.140
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	.109	<.001	.682	.121	<.001	.067	.666	.131	.094	.015	.017	.096	.077	.446	.410
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...learning new things using EdTech.	Pearson Correlation	.813**	1	.665**	.407**	.385**	.391*	.584**	-.188	-.196	-.397**	-.218	.030	-.115	-.256	-.349*	-.440**	-.199	-.308	-.083	-.015
	Sig. (2-tailed)	<.001		<.001	.012	.019	.017	<.001	.265	.244	.015	.195	.861	.499	.126	.034	.006	.237	.063	.627	.931
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...focus on assignments taught using EdTech.	Pearson Correlation	.608**	.665**	1	.552**	.426**	.401*	.584**	-.267	-.411*	-.553**	-.280	-.116	-.253	-.485**	-.402*	-.458**	-.372*	-.290	-.133	-.222
	Sig. (2-tailed)	<.001	<.001		<.001	.009	.014	<.001	.111	.012	<.001	.093	.496	.131	.002	.014	.004	.023	.082	.434	.187
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...complete assignments and tasks that have been set using EdTech.	Pearson Correlation	.521**	.407**	.552**	1	.508**	.277	.578**	-.346*	-.413*	-.322	-.354*	-.299	-.356*	-.445**	-.370*	-.395*	-.383*	-.257	-.256	-.306
	Sig. (2-tailed)	<.001	.012	<.001		.001	.097	<.001	.036	.011	.052	.032	.072	.031	.006	.024	.016	.019	.124	.126	.066
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...don't put much effort into content taught using EdTech.	Pearson Correlation	.539**	.385**	.426**	.508**	1	.127	.650**	-.176	-.318	-.359*	-.323	-.283	-.220	-.148	-.285	-.352*	-.295	-.345*	-.119	-.120
	Sig. (2-tailed)	<.001	.019	.009	.001		.453	<.001	.297	.055	.029	.051	.089	.190	.383	.087	.033	.076	.037	.482	.481
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...often distracted or off task when using EdTech.	Pearson Correlation	.268	.391*	.401*	.277	.127	1	.413*	-.130	-.297	-.206	-.064	-.300	.055	-.391*	-.382*	-.434**	-.331*	-.242	-.659**	-.602**
	Sig. (2-tailed)	.109	.017	.014	.097	.453		.011	.442	.075	.221	.709	.072	.746	.017	.020	.007	.045	.149	<.001	<.001
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...interested in learning via EdTech tools.	Pearson Correlation	.678**	.584**	.584**	.578**	.650**	.413*	1	-.135	-.182	-.278	-.212	-.088	-.138	-.128	-.142	-.338*	-.193	-.124	-.310	-.252
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	.011		.426	.282	.095	.209	.604	.415	.452	.402	.042	.252	.463	.062	.132
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...parents don't care about or value education.	Pearson Correlation	-.070	-.188	-.267	-.346*	-.176	-.130	-.135	1	.440**	.036	.313	.252	.466**	.471**	.229	.441**	.326*	.158	-.048	.084
	Sig. (2-tailed)	.682	.265	.111	.036	.297	.442	.426		.006	.834	.060	.133	.004	.003	.172	.006	.049	.350	.777	.620
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...don't see the value of what they are being asked to learn.	Pearson Correlation	-.259	-.196	-.411*	-.413*	-.318	-.297	-.182	.440**	1	.582**	.381*	.719**	.367*	.791**	.625**	.613**	.752**	.487**	.389*	.424**
	Sig. (2-tailed)	.121	.244	.012	.011	.055	.075	.282	.006		<.001	.020	<.001	.025	<.001	<.001	<.001	<.001	.002	.017	.009
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
...don't have aspirations that connect to education.	Pearson Correlation	-.534**	-.397**	-.553**	-.322	-.359*	-.206	-.278	.036	.582**	1	.318	.355*	.375*	.632**	.688**	.600**	.525**	.445**	.156	.289

like plans to go on to college.	Sig. (2-tailed)	<.001	.015	<.001	.052	.029	.221	.095	.834	<.001	.055	.031	.022	<.001	<.001	<.001	<.001	.006	.357	.083	
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...they don't have support at home.	Pearson Correlation	-.304	-.218	-.280	-.354*	-.323	-.064	-.212	.313	.381*	.318	1	.501**	.781**	.423**	.322	.312	.368*	.412*	.097	.087
	Sig. (2-tailed)	.067	.195	.093	.032	.051	.709	.209	.060	.020	.055	.002	<.001	.009	.052	.060	.025	.011	.567	.608	
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...don't see the point of learning the content, then they aren't motivated to learn it.	Pearson Correlation	-.073	.030	-.116	-.299	-.283	-.300	-.088	.252	.719**	.355	.501**	1	.470**	.617**	.413*	.509**	.600**	.576**	.419**	.423**
	Sig. (2-tailed)	.666	.861	.496	.072	.089	.072	.604	.133	<.001	.031	.002	.003	<.001	.011	.001	<.001	<.001	<.001	.010	.009
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...too many home problems to make school a priority.	Pearson Correlation	-.253	-.115	-.253	-.356*	-.220	.055	-.138	.466**	.367*	.375*	.781**	.470**	1	.501**	.325*	.425**	.369*	.429**	.050	.157
	Sig. (2-tailed)	.131	.499	.131	.031	.190	.746	.415	.004	.025	.022	<.001	.003	.002	.049	.009	.025	.008	.770	.353	
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...don't see the relevance of the content in their world.	Pearson Correlation	-.279	-.256	-.485**	-.445**	-.148	-.391*	-.128	.471**	.791**	.632**	.423**	.617**	.501**	1	.671**	.742**	.784**	.546**	.323	.407**
	Sig. (2-tailed)	.094	.126	.002	.006	.383	.017	.452	.003	<.001	<.001	.009	<.001	.002	<.001	<.001	<.001	<.001	<.001	.051	.012
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...education has no place in the futures they see for themselves.	Pearson Correlation	-.396*	-.349*	-.402*	-.370*	-.285	-.382*	-.142	.229	.625**	.688**	.322	.413*	.325*	.671**	1	.692**	.566**	.547**	.408*	.507**
	Sig. (2-tailed)	.015	.034	.014	.024	.087	.020	.402	.172	<.001	<.001	.052	.011	.049	<.001	<.001	<.001	<.001	<.001	.012	.001
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...because of peer pressure to devalue school.	Pearson Correlation	-.390*	-.440**	-.468**	-.395*	-.352*	-.434**	-.336*	.441**	.613**	.600**	.312	.509**	.425**	.742**	.692**	1	.630**	.751**	.417*	.565**
	Sig. (2-tailed)	.017	.006	.004	.016	.033	.007	.042	.006	<.001	<.001	.060	.001	.009	<.001	<.001	<.001	<.001	<.001	.010	<.001
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...they don't see how useful this information can be.	Pearson Correlation	-.278	-.199	-.372*	-.383*	-.295	-.331*	-.193	.326*	.752**	.525**	.368*	.600**	.369*	.784**	.566**	.630**	1	.554**	.336*	.396*
	Sig. (2-tailed)	.096	.237	.023	.019	.076	.045	.252	.049	<.001	<.001	.025	<.001	.025	<.001	<.001	<.001	<.001	<.001	.042	.015
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
Negative peer pressure is one big reason...	Pearson Correlation	-.294	-.308	-.290	-.257	-.345*	-.242	-.124	.158	.487**	.445**	.412	.576**	.429**	.546**	.547**	.751**	.554**	1	.384*	.404*
	Sig. (2-tailed)	.077	.063	.082	.124	.037	.149	.463	.350	.002	.006	.011	<.001	.008	<.001	<.001	<.001	<.001	<.001	.019	.013
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...because they are just lazy.	Pearson Correlation	-.129	-.083	-.133	-.256	-.119	-.659**	-.310	-.048	.389*	.156	.097	.419**	.050	.323	.408*	.417*	.336*	.384*	1	.801**
	Sig. (2-tailed)	.446	.627	.434	.126	.482	<.001	.062	.777	.017	.357	.567	.010	.770	.051	.012	.010	.042	.019	<.001	
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
...just don't care about learning-period.	Pearson Correlation	-.140	-.015	-.222	-.306	-.120	-.602**	-.252	.084	.424**	.289	.087	.423**	.157	.407*	.507**	.565**	.396*	.404*	.801**	1
	Sig. (2-tailed)	.410	.931	.187	.066	.481	<.001	.132	.620	.009	.083	.608	.009	.353	.012	.001	<.001	.015	.013	<.001	
	N	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The above table shows the correlations between perceived motivation and reasons for lack of motivation in students. Not all the motivational roadblocks influenced perceived motivation, however, where a correlation occurred it was always negative.

Student's willingness to learn using EdTech was strongly negatively correlated to their aspirations to further their education ($r(35) = -.543, p < .001$), and moderately negatively correlated with their aspirations for the future in general ($r(35) = -.396, p < .05$) and experiencing peer pressure regarding devaluing school ($r(35) = -.39, p < .05$). This shows that students' willingness to engage in EdTech was negatively impacted by their wish to not continue within education.

Students' willingness to learn new things using EdTech was moderately negatively correlated to their aspirations to further their education ($r(35) = -.397, p < .05$), their aspirations for the future in general ($r(35) = -.349, p < .05$) and experiences of peer pressure regarding devaluing school ($r(35) = -.44, p < .001$). In accordance with students' willingness to engage in EdTech in general, their willingness to learn new things using EdTech was also negatively impacted by their general wish to continue with education. Peer pressure to devalue school also led to students being unwilling to learn new skills via EdTech platforms.

Students focus on assignments taught using EdTech is highly negatively correlated with their aspirations for further education ($r(35) = -.553, p < .001$) and moderately negatively correlated with students not seeing the value of what they are being asked to learn ($r(35) = -.411, p < .05$), not seeing the relevance of the content taught to their work ($r(35) = -.485, p < .05$), education not having a place in the future they see for themselves ($r(35) = -.402, p < .05$), their experience with peer pressure regarding devaluing school ($r(35) = -.468, p < .05$) and the students not seeing how useful the taught information can be ($r(35) = -.372, p < .05$). Student who did not see the relevance of set assignments or who faced peer pressure to find the taught content or school 'uncool' were less likely to focus on set assignments.

Students completion of assignments and tasks that have been set using EdTech was moderately negatively correlated with their parents not caring about or valuing education ($r(35) = -.346, p < .05$), the students not seeing the value of what they are being asked to learn ($r(35) = -.413, p < .05$), students not having support at home ($r(35) = -.354, p < .05$), students having too many problems at home to prioritise school ($r(35) = -.356, p < .05$), education not having a place in the futures they saw for themselves ($r(35) = -.370, p < .05$), students experiencing peer pressure regarding devaluing school ($r(35) = -.395, p < .05$) and students not seeing how useful

the learned information could be ($r(35) = -.372, p < .05$). Completion of assignments and tasks via an EdTech platform was also moderately negatively correlated with students not seeing the relevance of the content in their world ($r(35) = -.445, p < .001$). Lack of support at home, parents who do not value education and students facing problems at home lead to students not completing tasks set via EdTech platforms. Additionally, students who did not see an education in their future were facing peer pressure or did not think that the taught information was useful were less likely to complete assignments.

Students not putting a lot of effort into content taught using EdTech was correlated moderately negatively with their aspirations about future education ($r(35) = -.359, p < .05$), peer pressure regarding devaluing education ($r(35) = -.352, p < .05$) and negative peer pressure ($r(35) = -.345, p < .05$). This shows that students with low aspirations and students being exposed to a lot of negative peer pressure regarding education were more likely to put little effort into learning content taught using EdTech.

Student being off task or distracted when using EdTech was moderately negatively correlated with them not seeing the relevance of the taught content in their world ($r(35) = -.391, p < .05$), education not having a place in their futures ($r(35) = -.382, p < .05$), peer pressure devaluing school ($r(35) = -.434, p < .05$) and students not seeing how useful taught information could be ($r(35) = -.331, p < .05$). Distractions when using EdTech was also highly negatively correlated with students being lazy ($r(35) = -.659, p < .001$) or not caring about learning ($r(35) = -.602, p < .001$). This shows that distractions can be caused by internal and external factors such as students not being able to relate taught content back to their world, the peer pressure they face or them just genuinely not being interested in education.

Students interest in learning via EdTech tools is moderately negatively correlated to students facing peer pressure around devaluing school ($r(35) = -.336, p < .05$), which shows that students environments and the people they surround themselves with can lead to them not showing an interest in education.

Correlations were also found between perceived motivations variables. Students trying to learn things using EdTech was highly positively correlated with them learning about new topics ($r(35) = .813, p < .001$), their focus on assignments being taught using EdTech ($r(35) = .608, p < .001$), students completing set assignments ($r(35) = .521, p < .001$), students putting effort into the taught content ($r(35) = .539, p < .001$) and their interest in learning via EdTech tools ($r(35) = .678, p < .001$). Above-described results show that students' willingness to engage

with EdTech is influenced by the novelty of topics they learn as well as that the more they are trying to learn via EdTech the more they are focusing on the assignments, completing them, and putting effort into them. It can also be concluded that students who are interested in using EdTech are easier able to learn via these platforms.

Students learning new content via EdTech was highly positively correlated with their interest in learning via EdTech ($r(35) = .584, p < .001$). It was also found that learning about new topics was moderately positively correlated with students completing assignments having set using EdTech ($r(35) = .407, p < .05$), them not putting much effort into the taught content ($r(35) = .385, p < .05$) and students being distracted ($r(35) = .391, p < .05$). Concluding these findings show that it is important for students to learn new content to garner their interest and for them to focus on assignments. Students being presented with new and changing content are also less likely to get distracted and will put effort into their studies.

Students focus on assignments taught using EdTech was highly positively correlated to them learning new things ($r(35) = .665, p < .001$), completion rates of assignments being set using EdTech ($r(35) = .552, p < .001$), them not putting effort into the assignments ($r(35) = .426, p < .001$), and their interest in learning via EdTech tools ($r(35) = .584, p < .001$). If students focused on their assignments via EdTech they were more likely to learn new things, complete set assignments and put effort into them. Focus on assignments was also modestly positively correlated with students often being distracted ($r(35) = .401, p < .05$), which allows for the conclusion that focus on assignments is not influenced by distractions via EdTech platforms.

Assignments being set via the use of EdTech have been found to highly positively correlate with the students not putting effort into the taught content ($r(35) = .508, p < .001$) and students' interest to learn using EdTech tools ($r(35) = .578, p < .001$). This shows that students will put more effort into assignments set via the use of EdTech and display greater interest in them.

Students not putting a lot of effort into set tasks was highly positively correlated with their interest in learning via EdTech, ($r(35) = .650, p < .001$), showing that students who wanted to learn using new tools would put effort into their tasks. Similar findings were reported for how often students got distracted when using EdTech, showing that students who had a general interest in learning via EdTech tools were less likely to get distracted (moderate, positive correlation; $r(35) = .413, p < .05$).

Within the reasons for students lacking motivation, there were several correlations, showing how they can influence and trigger each other. Students who had parents that did not value education have been found to show moderate positive correlations with the students not seeing a value of what they were being asked to learn ($r(35) = .44, p < .001$), students having a lot of problems at home ($r(35) = .466, p < .001$), students not seeing the relevance of the taught content in their world ($r(35) = .471, p < .001$), students being more prone to giving into negative peer pressure ($r(35) = .441, p < .001$) and them not seeing how useful the taught information could be for them ($r(35) = .326, p < .001$). This shows that parents have a very big influence on their children's education through their own attitudes towards this topic.

Students not seeing the value of what they were being asked to learn was highly positively correlated with students not having aspirations for higher education ($r(35) = .582, p < .001$), them not seeing a point in learning the content ($r(35) = .719, p < .001$), them not seeing the relevance of the taught content ($r(35) = .791, p < .001$), students not seeing education having a place within their future ($r(35) = .625, p < .001$), the peer pressure to devalue school they experience ($r(35) = .613, p < .001$), and them not seeing any use in the information that is being taught ($r(35) = .752, p < .001$). Moderately positive correlations were found within students not seeing the value in taught materials and them not having support at home ($r(35) = .381, p < .05$), the students facing too many problems at home ($r(35) = .367, p < .05$), the negative peer pressure they are exposed to ($r(35) = .487, p < .001$), students just being lazy ($r(35) = .389, p < .05$) and them not caring about learning ($r(35) = .424, p < .05$). This shows that students not seeing the value behind the taught content is one of the most influential reasons for lack of motivation.

Students lacking aspirations that are connected to higher education was highly positively correlated to them not seeing the relevance of the content taught ($r(35) = .632, p < .001$), not seeing education in their futures ($r(35) = .688, p < .001$), the peer pressure to devalue school ($r(35) = .6, p < .001$) and the students not seeing how useful the taught information could be ($r(35) = .525, p < .001$). Lack of aspirations was also moderately positively correlated to students not seeing a point of learning the content ($r(35) = .355, p < .05$), too many problems at home ($r(35) = .375, p < .05$), and negative peer pressure ($r(35) = .445, p < .001$). Negative peer pressure, problems at home and students not seeing education in their futures leads to a lack of aspirations within students.

Students lack of support at home was highly positively correlated with students not being

motivated to learn ($r(35) = .501, p < .001$) and students facing too many problems at home ($r(35) = .781, p < .001$). Lack of support was also moderately positively correlated with students not seeing a relevance of the content in their world ($r(35) = .423, p < .001$), students not seeing a use for the taught information ($r(35) = .368, p < .05$) and negative peer pressure ($r(35) = .412, p < .05$). Above results show that having support at home led to students not seeing a relevance or use for the taught content.

Students general lack of motivation was highly positively correlated with them not seeing any relevance of the taught content in their life ($r(35) = .617, p < .001$), the peer pressure to devalue education they were exposed to ($r(35) = .509, p < .001$), them not seeing the use of any of the taught content ($r(35) = .6, p < .001$) and negative peer pressure in general ($r(35) = .576, p < .001$). A general lack of motivation was also moderately positively correlated with students facing too many problems at home ($r(35) = .47, p < .001$), students not seeing education in their futures ($r(35) = .413, p < .05$), students being lazy ($r(35) = .419, p < .001$) and students just not wanting to learn ($r(35) = .423, p < .001$). Lack of motivation influences a lot of factors within students, such as them not wanting to learn or students being lazy, however, a lack of motivation can also stem from students facing problems at home or them not wanting to continue within education.

Facing problems at home was highly positively correlated with students not seeing a relevance for taught content in their world ($r(35) = .501, p < .001$) and moderately positively correlated to students not seeing education having a place within their futures ($r(35) = .325, p < .05$), students facing peer pressure to devalue school ($r(35) = .425, p < .001$), students not seeing how useful taught information could be ($r(35) = .369, p < .05$) and students facing negative peer pressure ($r(35) = .429, p < .001$). This shows that students who have problems at home cannot see how education can better their lives, which means it has no relevance to them and their immediate struggles. Problems at home also make students more susceptible to peer pressure since they will desperately want to fit in and find the support they lack at home, which will make these students succumb to peer pressures. Students with problems at home cannot see how education can fit into their lives or how information taught in school could ever be of use to them.

Students not seeing the relevance of the content taught at school in their world was highly positively correlated with education having no place in their futures ($r(35) = .671, p < .001$), peer pressure to devalue school ($r(35) = .742, p < .001$), students not finding taught

information useful ($r(35) = .784, p < .001$) and negative peer pressure ($r(35) = .546, p < .001$) as well as a moderately positive correlation with students just not wanting to learn ($r(35) = .407, p < .05$). Relevance proves to be highly important for student engagement and also leads to students leaning into peer pressure.

Education not having a place in the students future has been found to be strongly positively correlated to students due to peer pressure to devalue school ($r(35) = .692, p < .001$), students not seeing the use in taught content ($r(35) = .566, p < .001$) students being exposed to negative peer pressure ($r(35) = .547, p < .001$) and students not wanting to learn ($r(35) = .507, p < .001$) as well as moderately positively correlated to students just being lazy ($r(35) = .408, p < .05$). Students becoming disillusioned with taught materials in schools will not want to engage or continue their education further than necessary.

Peer pressure to devalue school was highly positively correlated with students not seeing how useful taught information can be ($r(35) = .63, p < .001$), general negative peer pressure ($r(35) = .751, p < .001$) and students not caring about learning ($r(35) = .565, p < .001$). Pressure to devalue school was also moderately positively correlated with students being lazy ($r(35) = .417, p < .05$). This shows that peer pressure can be a reason why students do not engage with the learning material or do not care about learning at all.

Not seeing how useful taught content could be shows a strong positive correlation with negative peer pressure, ($r(35) = .554, p < .001$) and moderate positive correlation with students being lazy ($r(35) = .336, p < .05$) or not wanting to learn ($r(35) = .396, p < .05$).

Negative peer pressure faced by students was moderately positively correlated with students being lazy ($r(35) = .384, p < .05$) and not wanting to learn ($r(35) = .404, p < .05$), which leads to the conclusion that this aversion to learning was not innate to the students but rather a result of the environment they were in.

Students being lazy has been found to be very highly positively correlated with them not caring about learning ($r(35) = .801, p < .001$). This shows that students are not lazy, but they are lazy because they do not want to learn.

4.3 Qualitative Results

The qualitative aspect of the questionnaire explored the factors that impact both students and teachers' motivation for using EdTech. These factors include enjoyment, ease of use, improved learning experience, independence, improved knowledge and academic performance, as well as the tailored learning EdTech platforms can provide.

4.3.1. Motivation to Use EdTech

4.3.1.1. *Current Motivational Factors Perceived for Students*

Overall, there are a range of factors that motivate students to use EdTech to support their education that is not always afforded by traditional teaching. Specifically, EdTech is seen to “enhance what is being taught in the classroom and reinforce learning.” From the perspective of the teachers in this study, the enjoyment experienced when using EdTech is the most influential motivating factor.

Enjoyment. When asked if students enjoy using EdTech for the purpose of learning, each of the 37 teachers indicated yes. It was identified that there are a number of reasons students enjoy using EdTech tools in their learning, however, the most influential reason noted was the fun students can have when using EdTech. One teacher suggested, “EdTech provides a fun and creative way to engage students in learning. I find students are always more motivated to learn when they have that element of fun and enjoyment.” Another teacher highlighted, “when students are having fun using EdTech, they are still learning but it doesn't feel like a lesson for them. I find it is then often easier for students to retain information if they can associate it with a fun EdTech game.” This element of enjoyment was also seen as a useful way to re-engage students that are demotivated, “[EdTech] works with students who don't like school to re-engage them back into education.”

Ease of Use. Along with being enjoyable, the expansion and embedding of technology in society nowadays means that many students have grown up with and have constant access to technology, leading to many young people expecting to utilise technology in all aspects of their lives, including education. As a result, many of the teachers observed, “it is a normal part of society now for students of this age group to be using devices and technology...there is a lot of work that needs to be done using EdTech.” Another teacher stated, “some children learn and retain more through using EdTech. They get so involved in the task because it's using technology.” The COVID-19 pandemic was also suggested to have had an impact on the way

in which students engage with EdTech, “I feel it is second nature to them, especially after its use during COVID-19 and blended learning.” One teacher also compared EdTech to traditional learning, “I feel they prefer education through the use of laptops and tablets rather than paper-based learning.” This repetitive exposure to technology means that EdTech is user friendly for many students, “most students do enjoy engaging with EdTech, especially if it's exciting, easy to use, and accessible.”

Independence. It was identified by the majority of teachers that one of the key elements that motivates students to utilise EdTech is the autonomy given. For example, one teacher stated, “students seem to enjoy the element of self-directed learning and being able to decide when they are ready to learn.” Another teacher discussed, “students enjoy using HwB as they find learning more independent and fun.” The independence surrounded by the use of EdTech was seen to be motivational due to students' ability to control their learning, “[EdTech] allows them to work at their own pace and further their own learning.” This also allows students to learn outside the classroom as it can encourage, “revision and self-learning.” The independence provided by EdTech also allows students to have more control over their learning. As one teacher explained, “some kids learn better using EdTech systems than being spoken to. They have more control over their learning.” This was reiterated by another teacher, “they [students] have more control over their learning and more progress can be made.”

Interactivity. The interactive nature of EdTech platforms was seen as a key element to motivating students as one teacher explained, “when left alone with a screen, kids generally interact better because of technology.” Another teacher suggested, “anything game related, interactive tools like puzzles and memory games are motivational for them [students].” EdTech also provides the opportunity for students through “interactive notebooks for exam revision” which could positively impact academic performance. The interactive element between students was also noted as a motivational factor, in particular having an interactive platform was suggested to “better their learning” as they are “...things which they can engage with fully.”

Learning Styles. Along with being interactive, EdTech has been acknowledged as suitable for all students with a variety of learning styles. As suggested, EdTech:

makes it easier and accommodates different learning styles, so kids that learn better visually can learn through graphs and images. Those that are auditory learners may be better suited to watching videos on offer, and those that are better at kinaesthetic learning can use the quizzes and puzzles to test their knowledge.

4.3.1.2. *Additional Factors that Could Motivate Students*

Although EdTech platforms already consist of a large variety of features that motivate students, there are a number of additional features teachers believe will further encourage student motivation.

Incentives. Many of the participants indicated that their students are motivated to complete tasks using EdTech when they are rewarded. These incentives included reward schemes as well as participation in competitions with leader boards. One teacher suggested students enjoy using EdTech, “especially if there is a competitive element involved.” This was reiterated by another teacher who said, “working online such as doing quizzes against other classmates is enjoyable and often motivates the students.” Some teachers also perceived the utilisation of EdTech platforms to share students work, especially as a positive example was good for students, “having it [their work] shared with others as a good example is motivational.” A few teachers identified that “a consistent reward scheme would motivate students to continue their engagement in learning” particularly “rewards with points that could be exchanged.”

Real-World Scenarios. For some students, particularly older students, participants believed that developing content that highlights real-world scenarios would be beneficial. A teacher mentioned, “linking it [content] to jobs they [students] may have in the future could allow students to see how content would be transferable.” This could improve academic success and prepare students for their future working environment, as stated by a teacher, “it prepares students better for the workplace.”

Organisation. An additional feature teachers also perceived would be beneficial for students is the implementation of planners to allow students to organise their learning, as a teacher explained, “EdTech should include weekly/monthly planners for students so they can plan their learning...or just to keep better track of what they learn.”

Parental Involvement. Another factor that was suggested to increase the motivation of students was the involvement of parents. This was particularly felt in situations where students do not engage in learning through EdTech, “parent involvement if weekly summary mentions missed homework.”

4.3.2. Impact of EdTech

4.3.2.1. *Positive Aspects*

Understanding of Curriculum. EdTech has been suggested to play a pivotal role in helping students to understand the content taught in class as it was acknowledged, "...the teacher is instrumental in ensuring this [understanding curriculum] ...but it is the technology that practically makes it easier to access and use, therefore having a positive impact." It was identified by many of the teachers that for students to gain the most out of using EdTech and for it to have the largest impact on the increased understanding of the curriculum, students must be confident and comfortable using the assigned platform as indicated, "some pupils find EdTech easy to grasp which then leads to a better understanding of the task and learning goal." The COVID-19 pandemic was thought to have had a particular impact on the way in which students understand the curriculum, with one teacher stating, "COVID lockdowns sped this forward [understanding of the curriculum]. Students are more confident after having to engage with EdTech from home during these periods." As a result, "...the links between learning in the classroom and home is formed. Students feel more confident in their learning." Furthermore, EdTech is suggested to support traditional teaching as "it [EdTech] helps develop understanding and embed prior learning."

Academic Performance. The increased understanding of the curriculum experienced was also suggested to lead to improvements in academic performance. One teacher described the specific impact they have seen as a result of EdTech use:

from my experience, I have seen a gradual improvement in grades through the use of the EdTech systems. The main improvements have been attendance is a lot better to lessons and engagement has been a lot better as it is not as tedious for the young learners. With students being more present and engaged, they are taking away more knowledge from the sessions. This ranges from better scores in maths quizzes to remembering facts and key details in science and English lessons.

Another teacher noted, "some students I work with do produce better quality work when not in a classroom. EdTech has enabled the students to prove what they can produce and show good results." The utilisation of additional EdTech content beyond tasks set by teachers have been noted as beneficial to academic performance as described by one participant, "my students are performing better in exams since introducing EdTech...which enables them to complete

additional tasks to prepare [for exams].” The use of EdTech also gives both students and teachers more control, “it allows easier access and students the ability to be in charge of their own learning. It is also a form of communication that allows for the checking of understanding which ultimately translates into improvement and progress.” Along with this, EdTech can adapt to the specific needs of students to tailor content to the appropriate level with suggestions that “...questions are adapted to learners' ability and stop once the questions become too hard and success begins to stop.” This ensures that students are adequately challenged and can excel in their academic performance. Overall, it was identified that EdTech has had a positive experience on academic performance as “it has improved their [students] confidence and self-belief in certain topics, which then translates into an improvement of grades.” However, there is one drawback that could impact academic performance as explained by one teacher, “students seem to always want the answer to the question as quickly as possible which EdTech can help with. The problem with this, I feel, is that students become less resilient to hunt for answers if the solution is not found quickly.”

4.3.2.2. *Negative Aspects*

Despite the motivating impact EdTech can have on students and the subsequent positive impact on academic performance perceived, some participants noted the negative elements of EdTech.

Distraction. It was discussed by some of the teachers that when utilising EdTech platforms in lessons, some of their students can become distracted and “go off task.” Another teacher said, “students become distracted using technology. They want to communicate with friends and complete tasks they enjoy more than the set task.” It was also noted that younger students can become distracted, “it is very easy for younger students to access things they shouldn’t be looking at.”

Unsuitable Content. Some of the teachers in this study identified that the content provided on EdTech platforms is sometimes unsuitable or not relevant to the curriculum. For instance, one teacher commented on the large amount of resources, “sometimes the volume of resources is too extensive and not suitably filtered. Finding relevant information can therefore be very time consuming.” Along with this, content was described as, “too much written information that is boring and set out poorly.”

Lack of Teacher Training. One issue identified beyond EdTech is the lack of training

teachers have to take full advantage of the technology provided. One teacher said they would like “more training to use and take advantage of the tech fully.” This would benefit students by providing “teachers who are confident in supporting students in the use of the tech.”

Accessibility. The cost associated with using EdTech platforms is considered to be high, leaving these tools inaccessible to many students, particularly those in low socio-economic areas. As a result, it is identified that “sometimes the cost of some platforms is inaccessible.” Despite this, it was acknowledged by one teacher that some EdTech platforms are accessible for all, “particularly for students in Wales who get free access to many EdTech facilities through HwB.” EdTech also gives students the opportunity to access content in a range of settings as one teacher described, “HwB allows a range of different platforms which is extremely beneficial and accessible in and out of school.”

Reduced Social Skills. Although there is an opportunity for students to communicate through EdTech, some teachers believe an imbalance of EdTech to traditional teaching can impact students' social skills, as explained, “losing their [students] social skills with classmates as a result of overuse of devices and technology. There should be more balance in the classroom between using devices and activities that don't require technology.” Another teacher shared, “it [EdTech] should be used as a tool to aid learning rather than consume students completely. Students are losing other skills as a result of overuse of devices and technology.”

4.3.3. EdTech Features

4.3.3.1. *Useful Features for Students*

Games and Quizzes. According to the majority of participants, they perceived games and quizzes to be particularly effective for aiding students in their learning. As described by one teacher, “quizzes and retrieval tasks, as well as homework tasks which check knowledge and progress.” It was noted by a number of teachers that EdTech platforms that provide students with the necessary content followed by an opportunity to test the knowledge learned such as “tutorials followed by quizzes” or “educational games” were beneficial for learning.

Feedback. Another feature of EdTech that teachers perceived to be effective is the ability to provide feedback and communicate with other students. EdTech has been described as providing, “improved communication and constant access to materials.” Along with this, “leaving comments and feedback on each other's work” provides a way to encourage critical thinking and open dialogue between students as “they are able to give suggestions and make

comments to improve.”

4.3.3.2. *Useful Features for Teachers*

As well as providing many benefits to students, there are a number of features that can be utilised to support teachers.

Monitoring. EdTech has the added benefit of analysing and storing all student activity in one place. This gives teachers the “ability to monitor and track progress, set work regularly, and give students access to what they need.” The ability to monitor the progress of all students was also seen to be useful for “tracking who completed [assignments] and who didn’t.

Marking. A number of teachers have highlighted the ability to mark students' content is made easier using EdTech. This is especially the case when “voice notes can be left instead of written feedback.” An additional teacher made further comment on the ease of marking, “...we are able to monitor work effectively with minimal room for personal error.” This was found to be the case when considering grammatical errors. Specifically, EdTech offers “automatic grading of quizzes” which can reduce the workload of teachers.

Chapter 5

Discussion

This chapter provides a discussion of the findings of this study as well as provides an insight into potential prototypes for future development.

5.1. PSM

According to the results found within the PSM, perceived motivational factors within this sample influenced each other. For example, students who want to learn using EdTech will do so, they will also engage with the content and complete set assignments.

Within our sample, all stated reasons for lacking motivation have been found influential on the perceived student motivation, however, lack of perceived motivation was most influenced by students not being able to relate taught content back to their own lives, students not being able to understand the validity of what they were being asked to learn, as well as outside influences from their social environment. The social pressure causing lack of perceived motivation were mainly, parents lacking aspirations for their children's education and peer pressure to devalue school.

Interestingly, it was found that within our sample, EdTech was not commonly distracting students. If the students wanted to learn using EdTech they did not get distracted and were not lacking effort. This shows that student's willingness was a main factor when it came to engagement in EdTech within class. Although, it should be noted that within our sample, students not putting effort into the content they were asked to learn was only negatively influenced by their own lack of aspirations when it came to furthering their education and their peers pressuring them to devalue school. This shows that within our sample, teachers perceived that only students who did not have aspirations lacked effort in the completion of tasks set via an EdTech platform.

When it came to perceived distractions through EdTech, it was found that only students who did not see relevance in the taught content were perceived to be lazy or pressured into devaluing school got distracted. However, perceived students' distractions were not one of the motivational factors impacted the most by outside influences. In addition, it should be noted that children are not just lazy. This finding is not only illustrated within data collected through

employing the PSM within this sample, showing that laziness was merely a factor of other influences such as students being unable to relate the content to their lives and disengaging in turn or the peer pressure they were exposed to. These findings within our sample have also been supported within wider literature [23].

The two motivational factors within our sample that were influenced the most by intrinsic and extrinsic ‘roadblocks’ within the students’ life were assignment focus and completion. In particular, this means that students’ perceived lack of focus on assignments and their completion was mainly influenced by them not being able to see a relevance in completing settasks, the assignment not having connections to their lives and a lack of aspirations to continue within education. Peer pressure only influenced non-completion and lack of focus within the completion of assignments where it was devaluing school and lack of parental aspirations only mattered for the completion of assignment but did not account for a lack of focus within our sample.

Within this sample, it was found that the more external factors students were facing the lower their motivation was, which is in line with [37] who found that students’ motivation was primarily intrinsic and influenced by external factors such as pressure and social expectations in an East Asian sample of 404 high school teachers. Social expectations and pressure as influential indicators for motivation were also found in our sample as the perceived student motivation when engaging with EdTech was highly dependent on outside factors such as peer pressure and parent’s views on education. However, while in the East Asian sample parents’ expectations for students to get into good colleges influenced their motivation [37], our sample revealed that perceived lack of parental aspirations also caused a lack aspirations to continue education. In addition, our data revealed that students who did not see education in their futures were lacking perceived motivation.

Lacking aspirations for future education has been found as one of the main factors in lacking student motivation to engage with EdTech within our sample and influenced, five of the seven motivational aspects. Parents lacking an understanding for the value of education will also have a lower perception of their children’s ability, which in turn influences academic achievement and motivation [41]. Lack of parental involvement in education can especially be found in low-income and first-generation students and severely impact their motivation in regards to entering higher education, due to parents valuing earning money over continuing on the academic path as going to university is time intensive and expensive [61]. This finding is

especially interesting considering that the teachers in this study mainly taught at high school and results show that within this sample parents lack of valuing education did lead to students not seeing education within their future as parental involvement within education has been associated with continued engagement in class and in continuing education past high school [34]. However, as there is no demographic data allowing to draw conclusion on the students' socioeconomic backgrounds, this finding has to be treated carefully and further data collection has to occur. Perceived lack of aspirations as found within our sample, while highly influenced by social expectations, as well as peer pressure and pressures to appear cool among the student's friend group, can also be tied back to parental lack of value based on education and within this sample, it has been found that lacking aspirations within students leads to students not completing assignments using EdTech or not putting effort into set assignments.

Concluding, it has been found that while perceived motivation is highly dependent on intrinsic factors, both negatively and positively. For example, students not seeing how taught content relates to their lives will lack motivation to engage within the taught content, however within the positive intrinsic influences, it was also found that willingness to engage with EdTech was a main factor leading to assignment completion, focus and overall engagement with EdTech when it came to learning new concepts. Nevertheless, there were also a number of extrinsic factors, such as peer pressure or parental lack of involvement that led to students' perceived lack of motivation. Overall, it has also been found that extrinsic and intrinsic factors leading to a lack of motivation influence each other. This has been illustrated within our sample by peer pressure leading to students being perceived as lazy, which shows that it is not the "lazy student" but their environment which pressures them into becoming lazy by devaluing school.

5.2. Qualitative Discussion

The qualitative aspect of the questionnaire aimed to understand teachers' perspectives of student's motivation to utilise EdTech to support their learning. It was found that the biggest motivational factor was the enjoyment students derived from the use of EdTech. Research shows that student's enjoyment can act as a catalyst to encourage use of EdTech and subsequent improvement in learning outcomes [30]. The enjoyment experienced during an activity has been equated to the state of flow described by [21] in which students experience high levels of intrinsic motivation. Furthermore, intrinsic motivation highlighted by SDT is said to be attained when individuals are engaged in enjoyable activities in which they can play and explore activities that are inherently fun and challenging, again leading back to the experience of a flow

state. Furthermore, for students that enjoy learning through the use of EdTech, it is likely that their needs for competence, relatedness, and autonomy are met such that tasks are suitably challenging for students, they relate to others completing the same tasks, but they also feel they are in control and able to master the task autonomously. This leads to heightened enjoyment and motivation [63]. SDT can also be utilised to understand students' perceived enjoyment of the independence afforded by EdTech. This again satisfies students' need for autonomy. It was found that students who experienced higher perceived autonomy displayed greater success in the use of EdTech and academic outcomes than those who had lower perceived autonomy [75].

The usability of EdTech devices was also perceived to be an important factor that influences a student's motivation to utilise these platforms. It has been found that the perceived ease of use and usefulness of EdTech are significant predictors of intentions to use technology. Accordingly, it is identified that perceived ease of use are important precursors of behavioural intentions to use EdTech based on the belief utilising this platform will enhance academic performance [51]. Along with ease of use, EdTech platforms that are interactive were perceived to be a motivational factor by teachers within this study. Research has identified that tools that are highly interactive, challenging, and competitive encourage students to be more attentive and therefore, concentrate on the content provided [79].

The participants of this study also had concerns with the use of EdTech. This mainly related to students becoming distracted and being off-task. Becoming distracted when using EdTech can be a significant problem particularly when students instead engage in social networking sites, news, videos, and communication with friends. This can reduce our capacity to remember important content and can impact our academic performance [1]. To reduce the impact of distractions, it is suggested that schools restrict the access students have to certain apps or place a lock on the EdTech features necessary. This could act to reduce the distractions that occur.

5.2.1. Prototypes

Based on the findings of this study, there are a number of opportunities to implement changes to motivate students to utilise EdTech to increase learning outcomes. As suggested by the participants, it is perceived that students' complete tasks if they have incentives to do so.

5.2.1.1. *Prototype One: Points and Leaderboards*

It was identified that one way to motivate students to engage in learning is to develop competitions and reward schemes. In order to do this, EdTech platforms should be built upon to create point systems in which you collect points for each quiz or challenge you complete. Figure 5.1 highlights a prototype for this points system.

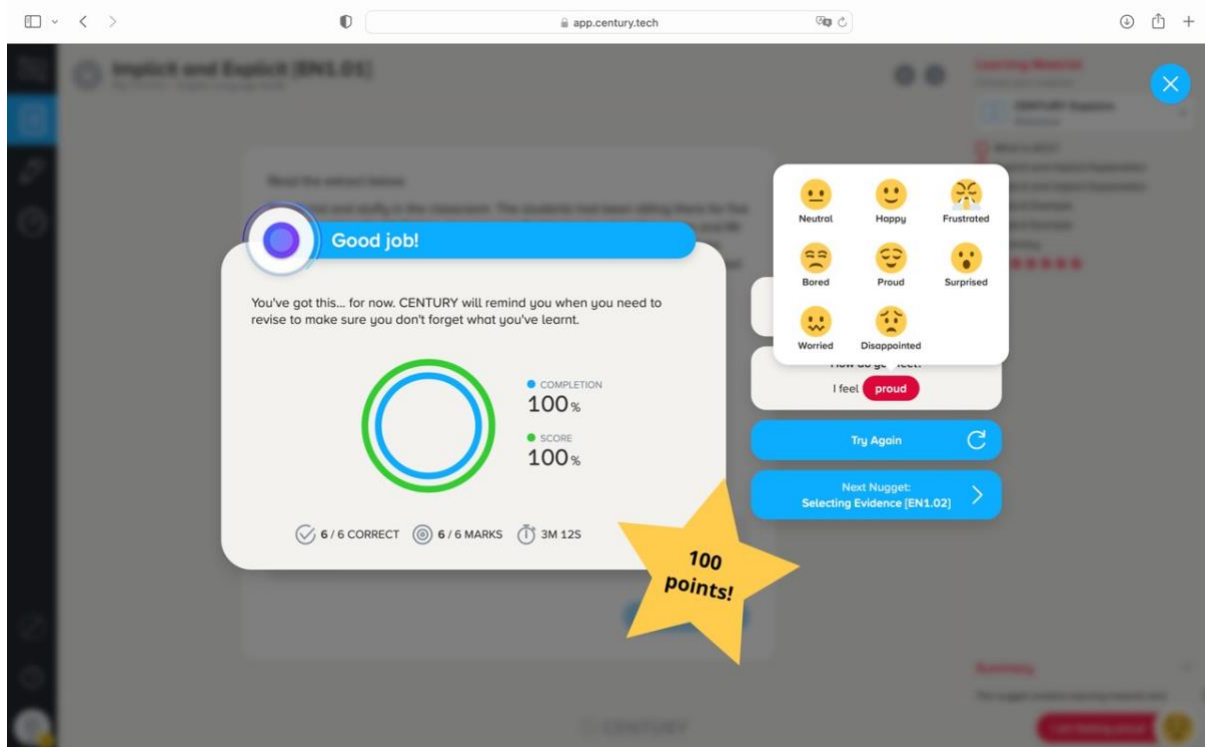


Figure 5.1: Points System Prototype

The collection of these points can either be kept private so that only the student can see how many points they have collected, or the points can be displayed on an anonymous class leaderboard as shown in Figure 5.2. This leaderboard will provide students with an understanding of where they are within the classroom but will not provide them with any information about other students. Through gamification, it is suggested that elements such as points or leaderboards can enhance students' motivation, engagement, interest, self-efficacy, and encourage critical thinking [92]. Furthermore, [31] found that motivated students have higher levels of confidence, are more willing to engage in class activities, and can better understand curriculum concepts. Furthermore, point systems and leaderboards can provide students with feelings of competence, enhancing their intrinsic motivation and improving overall performance [60]. Anonymising this leaderboard will minimise any social pressures but still

offer competitive motivation [5]

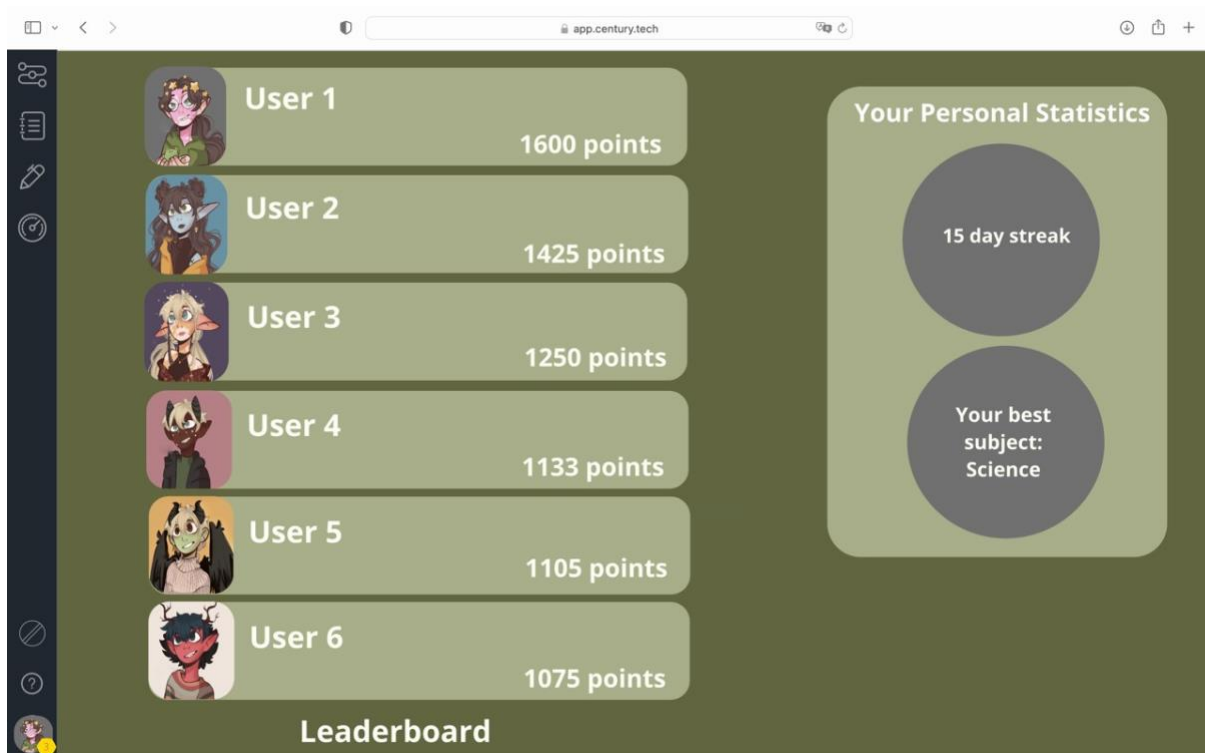


Figure 5.2: Leaderboard Prototype

5.2.1.2. *Prototype Two: Customisation*

With the use of the points system introduced in prototype one, these points can be utilised to make customised designs to the EdTech platform. This could include such features as colour scheme or themes, icons, stickers, and specifically, avatars (See Figure 5.3). The customisability of such features as avatars is noted to promote intrinsically-rewarding behaviours that make student experiences more enjoyable. The ability to customise these features also provides students with the opportunity to have control over their learning environment, encouraging autonomy and competence [84]. The ability to customise your own avatar has also been shown to significantly assist learners and promotes positive emotional experiences throughout the learning process [76].

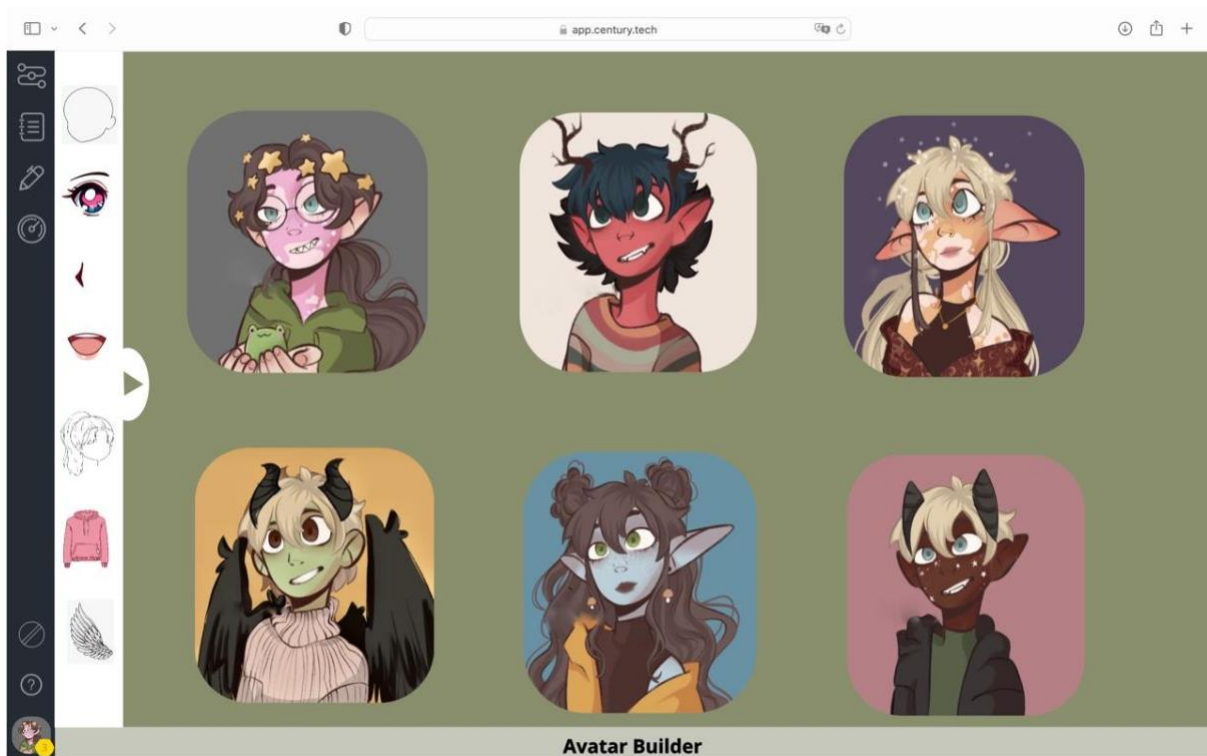


Figure 5.3: Customisable Avatars

5.2.1.3. *Prototype Three: Badges*

The final prototype that can be used as an incentive to encourage students and increase levels of motivation are badges. These badges can be given on a daily, weekly, or monthly basis based on challenges completed as shown in Figure 5.4. Research has shown that learner motivation drives the students to collect these badges and in turn, the collection of badges motivates learners. It is also noted that the type of badge collected can have an influence on students' motivation to collect said badges [2], as a result, it is suggested this implementation create limited edition badges that can only be collected following participation in one-time events. For example, students could collect an Earth Day badge after learning about climate change or a World Book Day badge for completing reading challenges on World Book Day. These could have a significant impact on learning outcomes and motivation to use EdTech.

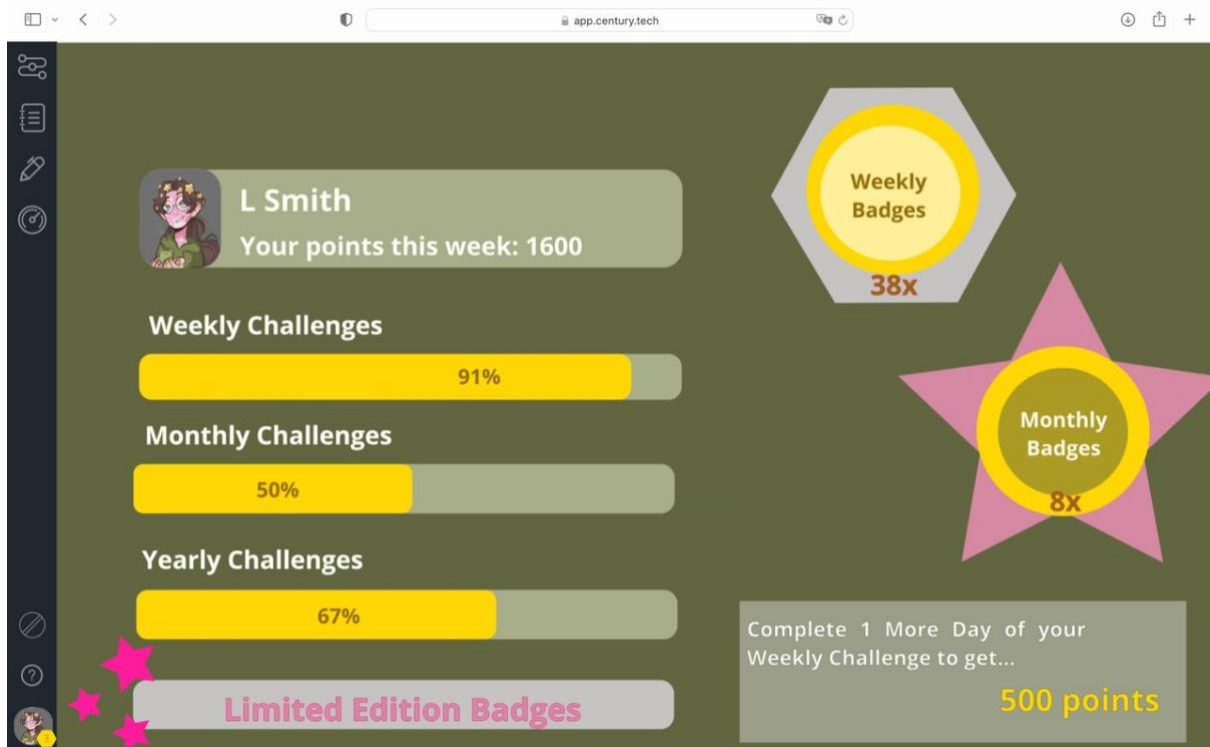


Figure 5.4: Badges

Chapter 6

Conclusion

6.1. Summary

The use of EdTech has grown exponentially in recent years due to the growth of the technology industry and the unprecedented impact of the COVID-19 pandemic. As a result, EdTech is rapidly expanding across the world in educational settings. Despite this, limited research has been conducted on the impact EdTech can have as well as, and more importantly, the motivation of students to utilise EdTech.

This first part of the wider project sought to gain the teachers perceptions of factors that impact students' motivation to use EdTech platforms. It was found that teachers perceive the enjoyment of using these platforms is the number one motivational factor for students. Following this, students are perceived to like the independence, ease of use, and interactivity afforded by these platforms. Beyond this, it was identified that students would be perceived to be more motivated to use EdTech platforms if they were incentivised with reward schemes and competitions. As a result, a number of prototypes were developed that EdTech platforms such as CENTURY can take forward to increase student motivation such as reward schemes, leaderboards, customisations, and badges.

6.2. Strengths and Limitations

It should be mentioned that this study has strengths and limitations. Firstly, this study provided a detailed description of perceptions of student motivation to use EdTech tools from the perspective of teachers. This is important as teachers are often the ones to bring EdTech into the classroom. Utilising this perspective has also provided the opportunity to develop prototypes to enhance learner motivation which can be tested during the next phase of this project. As this study was conducted through an online questionnaire, participants were able to

complete the questionnaire in their own time and at their own pace which may encourage open and honest feedback [73]. This study also has a few limitations regarding demographic data. For example, no geographical data was collected showing the county the teacher's school was located. It is also unknown whether these schools were public or private, how many pupils were based at the school, and the age range of the teachers. All these factors could influence how EdTech was utilised within the school as well as the teachers' attitude towards EdTech or student motivation. The type of school and its geographical location could give an overview of the level of funding schools have to spend and in turn explain their use of EdTech platforms. The selection process of teachers for this study was also limited to personal connections of the researcher which limits the generalisability of results.

6.3. Future Directions

Throughout the remainder of the project, additional knowledge can be gained, and the research collected during this study can be built upon. This will provide a well-rounded and informative picture of the motivations to use EdTech from multiple perspectives. As such, further research should be undertaken with additional participants including young people in primary and secondary schools. To this effect, prototypes can be developed and implemented such as the ones created within this study as a result of the feedback provided by the teachers. A human centred approach will be taken towards the iterative testing of these prototypes with students' opinions of the current designs as well as suggestions for amendments and further implementations will be gathered to ensure the implementation of any prototype will fit the needs of its users. The outcomes of these prototypes, if successful, can be utilised by an EdTech company such as CENTURY which will work towards bridging the gap between developers and end-users and aim to increase motivation of students.

Bibliography

- [1] Lynn S. Aaron and Talia Lipton. 2018. Digital distraction: Shedding light on the 21st century college classroom. *Journal of Educational Technology Systems* 46, 3 (Oct. 2017), 363-378. <https://doi.org/10.1177/0047239517736876>
- [2] Samuel Abramovich, Christian Schunn, and Ross M. Higashi. 2013. Are badges useful in education?: it depends upon the type of badge and expertise of learner. *Educational Technology Research and Development* 61, 2 (Mar. 2013), 217-232. <https://doi.org/10.1007/s11423-013-9289-2>
- [3] American University. School of Education. 2020. *How important is Technology in Education? Benefits, Challenges and Impact on Students*. (Jun. 2020). Retrieved September 21, 2022 from <https://soeonline.american.edu/blog/technology-in-education>
- [4] Tao An and Martin Oliver. 2021. What in the world is educational technology? Rethinking the field from the perspective of the philosophy of technology. *Learning, Media and Technology* 46, 1 (Jul. 2021), 6-19. <https://doi.org/10.1080/17439884.2020.1810066>
- [5] Sean D. Bailey. 2017. *Triviaprep: The design and development of a competitive academic trivia application*. Ph.D. Dissertation. Morehead State University, Kentucky. ProQuest 10275435
- [6] Helen L. Ball. 2019. Conducting online surveys. *Journal of Human Lactation* 35, 3 (May 2019), 413-417. <https://doi.org/10.1177/0890334419848734>
- [7] Albert Bandura. 1977. *Social learning theory*. Prentice Hall: Englewood Cliffs, NJ.
- [8] Albert Bandura. 1986. *Social foundations of thought and action: A social cognitive theory*. Prentice Hall: Englewood Cliffs, NJ
- [9] Brendan Bartram. 2019. Using questionnaires. In *Practical Research Methods in Education: An Early Researcher's Critical Guide*, Mike Lambert (Ed.). Routledge, Abingdon, Oxfordshire. 1-11. <https://doi.org/10.4324/9781351188395>
- [10] Tony Bates. 2019. *Teaching in a Digital Age* (2nd. ed.). SFU Document Solutions, Simon Fraser University.
- [11] Kristina N. Bauer, Karin A. Orvis, Katherine Ely, and Eric A. Surface. 2016. Re-

- examination of motivation in learning contexts: meta-analytically investigating the role type of motivation plays in the prediction of key training outcomes. *Journal of Business Psychology* 31, 1 (Feb. 2016), 33-50
- [12] G Bester and L Brand. 2013. The effect of technology on learner attention and achievements in the classroom. *South African Journal of Education* 33, 2 (Dec. 2013), 1-15. <https://doi.org/10.15700/saje.v33n2a405>
- [13] Christie Blazer. 2008. *Literature review: Educational technology*. Office of Assessment, Research and Data Analysis, Miami, FL. Retrieved July, 13, 2022 from <https://drs.dadeschools.net/AdditionalReports/Ed%20Technology.pdf>
- [14] Markus Blut and Cheng Wang. 2020. Technology readiness: a meta-analysis of conceptualizations of the construct and its impact on technology usage. *Journal of the Academy of Marketing Science* 48, 4 (Jul. 2020), 649-669. <https://doi.org/10.1007/s11747-019-00680-8>
- [15] Virginia Braun and Victoria Clarke. 2019. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 11, 4 (Jun. 2019), 589-597. <https://doi.org/10.1080/2159676X.2019.1628806>
- [16] Virginia Braun, Victoria Clarke, Nikki Hayfield, and Gareth Terry. 2019. Thematic Analysis. In *Handbook of Research Methods in Health Social Sciences*, Pranee Liamputtong (Ed.). Springer, Singapore. 843-860. https://doi.org/10.1007/978-981-10-5251-4_103
- [17] Virginia Braun and Victoria Clarke. 2021. One size fits all? What counts as quality practice in (reflexive) thematic analysis?. *Qualitative Research in Psychology* 18, 3 (Aug. 2020), 328-352. <https://doi.org/10.1080/14780887.2020.1769238>
- [18] David Byrne. 2022. A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality & Quantity* 56, 3 (Jun. 2022), 1391-1412. <https://doi.org/10.1007/s11135-021-01182-y>
- [19] Steve Campbell, Melanie Greenwood, Sarah Prior, Toniele Shearer, Kerrie Walkem, Sarah Young, Danielle Bywaters, and Kim Walker. 2020. Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing* 25, 8 (Dec. 2020), 652-661. <https://doi.org/10.1177/1744987120927206>

- [20] Rae Condie and Kay Livingston. 2007. Blending online learning with traditional approaches: Changing practices. *British Journal of Educational Technology* 38, 2 (Jun. 2007), 37-348. <https://doi.org/10.1111/j.1467-8535.2006.00630.x>
- [21] Mihaly Csikszentmihalyi. 2002. *Flow: The classic work on how to achieve happiness*. Rider Books, London.
- [22] Gokhan Daghan, and Abdullah Yasin Gunduz. 2022. Research trends in educational technology journals between 2000 and 2018: A web scraping study. *Education and Information Technologies* 27, 1 (Jan. 2022), 5179-5214. <https://doi.org/10.1007/s10639-021-10762-2>
- [23] Denis Dautov. 2020. Procrastination and laziness rates among students with different academic performance as an organizational problem. *E3S Web of Conferences* 210 (Dec. 2020), 1-10. <https://doi.org/10.1051/e3sconf/202021018078>
- [24] Edward L. Deci and Richard M. Ryan. 2008. Self-determination theory: A macrotheory of human motivation, development and health. *Canadian Psychology* 49, 3 (Jun. 2008), 182-185. <https://doi.org/10.1037/a0012801>
- [25] Edward L. Deci, and Richard M. Ryan. (2012). Motivation, Personality, and Development Within Embedded Social Contexts: An Overview of Self-Determination Theory. In *The Oxford Handbook of Human Motivation*, Richard M. Ryan (Ed), Oxford University Press, 85-107.
- [26] Department for Education. 2021. *Education Technology (EdTech) Survey 2020-21*. (May 2021). Retrieved September 4, 2022 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057817/Education_Technology_EdTech_Survey.pdf
- [27] Nahid K. Elfaki, Itedal Abdulraheem, and Rashida Abdulrahim. 2019. Impact of e- learning vs traditional learning on students' performance and attitude. *International Medical Journal* 24, 3 (Dec. 2019), 225-233.
- [28] Maya Escueta and Sarah Holloway. 2019. *Investment in education technology across the globe: Where profit meets purpose*. School of International and Public Affairs, Columbia University, NY. Retrieved September 13, 2022
- [29] Robert Fairlie and Prashant Loyalka. 2020. Schooling and covid-19: Lessons from recent

- research on edtech. *Science of Learning* 5, 13 (Aug. 2020), 1-2. <https://doi.org/10.1038/s41539-020-00072-6>
- [30] Fong-Ling Fu, Rong-Chang Su, and Sheng-Chin Yu. 2009. EGameFlow: A scale to measure learners' enjoyment of e-learning games. *Computers & Education* 52, 1 (Jan. 2009), 101-112. <https://doi.org/10.1016/j.compedu.2008.07.004>
- [31] Bas Giesbers, Bart Rienties, Dirk Tempelaar, and Wim Gijssels. 2013. Investigating the relations between motivation, tool use, participation, and performance in an e-learning course using web-video conferencing. *Computers in Human Behaviour* 29, 1 (Jan. 2013), 285-292. <https://doi.org/10.1016/j.chb.2012.09.005>
- [32] Idris Goksu and Yusuf I. Bolat. 2021. Does the ARCS motivational model affect student's achievement and motivation? A meta-analysis. *Review of Education* 9, 1 (Feb. 2021), 27-52. <https://doi.org/10.1002/rev3.3231>
- [33] Marta Gomez Domingo and Antoni Badia Gargante. 2016. Exploring the use of educational technology in primary education: Teachers' perception of mobile technology learning impacts and applications' use in the classroom. *Computers in Human Behavior* 56, (Mar. 2016), 21-28. <https://doi.org/10.1016/j.chb.2015.11.023>
- [34] Alyssa R. Gonzalez. 2010. Parental involvement: Its contribution to high school students' motivation. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas* 75, 3 (Apr. 2010), 132-134. <https://doi.org/10.1080/00098650209599252>
- [35] Leo A. Goodman. 1961. Snowball sampling. *Annals of Mathematical Statistics* 31, 1 (Mar. 1961), 148-170. <https://doi.org/10.1214/aoms/1177705148>
- [36] Salomey T. Hackman, and Stefan Reindl. 2022. Challenging edtech: Towards a more inclusive, accessible and purposeful version of edtech. *Knowledge Cultures* 10, 1 (Apr. 2022), 7-21. <https://doi.org/10.22381/kc10120221>
- [37] Patricia L. Hardré, Kendrick A. Davis, and David W. Sullivan. 2008. Measuring teacher perceptions of the "how" and "why" of student motivation. *Educational Research and Evaluation* 14, 2 (Apr. 2008), 155-179. <https://doi.org/10.1080/13803610801956689>
- [38] Chris Hayhurst. 2019. Teaching Teachers to put Tech Tools to Work: Classroom management and data analytics tools can help teachers in the classroom – if they understand how to apply them (Oct 2019). Retrieved September 20, 2022 from

<https://edtechmagazine.com/k12/article/2019/10/teaching-teachers-put-tech-tools-work>

- [39] Sara Hennessy, Katy Jordan, Daniel A. Wagner. 2021. *Problem Analysis and Focus of EdTech Hub's Work*. (March 2021). Retrieved August 28, 2022 from https://www.repository.cam.ac.uk/bitstream/handle/1810/319313/Problem%20Analysis_Technology%20in%20Education_Revised%20Final_1.pdf?sequence=1
- [40] Khe Foon Hew, Min Lan, Ying Tang, Chengyuan Jia, and Chung Kwan Lo. 2019. Where is the “theory” within the field of educational technology research?. *British Journal of Educational Technology* 50, 3 (Mar. 2019), 956-971. <https://doi.org/10.1111/bjet.12770>
- [41] Anke Heyder, Ursula Kessels, and Ricarda Steinmayr. 2017. Explaining academic-track boys' underachievement in language grades: Not a lack of aptitude but students' motivational beliefs and parents' perceptions?. *British Journal of Educational Psychology* 87, 2 (Jun. 2017), 205-223. <https://doi.org/10.1111/bjep.12145>
- [42] Ronghuai Huang, J. Michael Spector, and Junfeng Yang. 2019. *Educational technology: A primer for the 21st century*. Springer, Singapore.
- [43] Hwb. 2020. *Digital Professional Learning Journey*. Retrieved August 3, 2022 from <https://hwb.gov.wales/professional-development/digital-professional-learning-journey/>
- [44] Jeff Irvine. 2018. A framework for comparing theories related to motivation in education. *Research in Higher Education Journal* 35 (Oct. 2018), 1-30.
- [45] Alan Januszewski and Michael Molenda. 2008. *Educational technology: A definition with commentary*. Routledge, Abingdon, Oxford.
- [46] Avi Kaplan, Idit Katz, and Hanoch Flum (2012). Motivation Theory in Educational Practice: Knowledge Claims, Challenges, and Future Directions. In K. R. Harris, S. Graham, & T. Urdan (Eds.), *APA Educational Psychology Handbook: Vol. 2. Individual Differences and Cultural and Contextual Factor*. American Psychological Association, 165-194.
- [47] Shamyia Karumbaiah, Jaclyn Ocumpaugh, and Ryan S. Baker. 2022. Context matters: Differing implications of motivation and help-seeking in educational technology. *International Journal of Artificial Intelligence in Education* 32, 3 (Sep. 2022), 685-724. <https://doi.org/10.1007/s40593-021-00272-0>
- [48] John M. Keller .1987. Development and use of the ARCS model of instructional design.

Journal of Instructional Development, 10, 3 (Sept. 1987), 2-10.

- [49] Royce Kimmons, Joshua Rosenberg, and Bohdana Allman. 2021. Trends in Educational Technology: What Facebook, Twitter, and Scopus Can Tell us about Current Research and Practice. *TechTrends* 65, 2 (Feb. 2021), 125-136. <https://doi.org/10.1007/s11528-021-00589-6>
- [50] Eva Knekta, Christopher Runyon, and Sarah Eddy. 2019. Surveys in your research. *Life Sciences Education* 18, 1 (Mar. 2019), 1-17. <https://doi.org/10.1187/cbe.18-04-0064>
- [51] Yi-Hsuan Lee, Chan Hsiao and Sutrisno Hadi Purnomo. 2014. An empirical examination of individual and system characteristics on enhancing e-learning acceptance. *Australasian Journal of Education Technology* 30, 5 (Nov. 2014), 562-579. <https://doi.org/10.14742/ajet.381>
- [52] Lisa Legault, Isabelle Green-Demers, and Luc Pelletier. 2006. Why do high school students lack motivation in the classroom? Toward an understanding of academic motivation and the role of social support. *Journal of Educational Psychology*, 98, 3, 567-582. <https://doi.org/10.1037/0022-0663.98.3.567>
- [53] Ting, Li, and Richard Lynch. 2016. The relationship between motivation for learning and academic achievement among basic and advanced level students studying Chinese as a foreign language in years 3 to 6 at Ascot International School in Bangkok, Thailand. *Human Sciences Scholar*, 8, 1 (Jun. 2016).
- [54] Li-Fen Liao. 2006. A flow theory perspective on learner motivation and behaviour in distance education. *Distance Education* 27, 1 (May 2006), 45-62. <https://doi.org/10.1080/01587910600653215>
- [55] Min Liu, Lucas Horton, Justin Olmanson, and Paul Toprac. 2011. A study of learning and motivation in a new media enriched environment for middle school science. *Educational Technology Research and Development* 59, 2 (Apr. 2011), 249-265. <https://doi.org/10.1007/s11423-011-9192-7>
- [56] Edwin A. Locke, and Gary P. Latham. 2004. What Should We Do about Motivation Theory? Six Recommendations for the Twenty-First Century. *Academy of Management Review*, 29, 3 (Jul. 2004), 388-403. <https://doi.org/10.2307/20159050>
- [57] Loyola University. School of Education. 2021. *What is Educational Technology and Why*

- is it Important?*. Retrieved September 22, 2022 from <https://www.loyola.edu/school-education/blog/2021/what-is-educational-technology>
- [58] Giorgio Marinoni, Hilligje van't Land, and Trine Jensen. 2020. *The impact of covid-19 on higher education around the world*. International Association of Universities, Paris, France. Retrieved July 21, 2022 from https://www.uniss.it/sites/default/files/news/iau_covid19_and_the_survey_report_final_may_2020.pdf
- [59] Saul A. McLeod. 2016. *Bandura – social learning theory*. Simply Psychology. (Feb. 2016). Retrieved September 14, 2022 from www.simplypsychology.org/bandura.html
- [60] Elisa D. Mekler, Florian Bruhlmann, Alexandre N. Touch, and Klaus Opwis. 2017. Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. *Computers in Human Behaviour* 71 (Jun. 2017), 525-534. <https://doi.org/10.1016/j.chb.2015.08.048>
- [61] Allison M. Mitchall and Audrey J. Jaeger. 2018. Parental influence on low-income, first-generation students' motivation on the path to college. *The Journal of Higher Education* 89, 4 (Apr. 2018), 582-609. <https://doi.org/10.1080/00221546.2018.1437664>
- [62] Niaz M. Muhammad and Mitch Schneider. 2022. The role of edtech in enhancing learner's motivation. *Selangor Science & Technology Review* 5, 5 (Jan. 2022), 73-77.
- [63] Christopher P. Niemiec and Richard M. Ryan. 2009. Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education* 7, 2 (Jun. 2009), 133-144. <https://doi.org/10.11177/1477878509104318>
- [64] Francesca Peruzzo, Stephen J. Ball, and Emiliano Grimaldi. 2022. Peopling the crowded education state: Heterarchical spaces, edtech markets and new modes of governing during the covid-19 pandemic. *International Journal of Educational Research* 114, 2022 (May 2022), 102006. <https://doi.org/10.1016/j.ijer.2022.102006>
- [65] Sumitra Pokhrel and Roshan Chhetri. 2021 A literature review on impact of covid-19 pandemic on teaching and learning. *Higher Education for the Future* 8, 1 (Jan. 2021), 133-141. <https://doi.org/10.1177/2347631120983481>
- [66] Cong Qi. 2019. A double-edged sword? Exploring the impact of students' academic usage

- of mobile devices on technostress and academic performance. *Behaviour & Information Technology* 38, 12 (Feb. 2019), 1337-1354. <https://doi.org/10.1080/0144929X.2019.1585476>
- [67] Marko Radovan. 2011. The realisation between distance students' motivation, their use of learning strategies, and academic success. *The Turkish Online Journal of Educational Technology* 10, 1 (Jan. 2011), 216-222.
- [68] Lee Rainie and Barry Wellman. 2019. The internet in daily life: The turn to networked individualism. In *Society & The Internet: How Networks of Information and Communication are Changing Our Lives*, Mark Graham and William H. Dutton (Eds.). Oxford University Press, Oxford. 27-42. DOI: <https://doi.org/10.1093/oso/9780198843498.001.0001>
- [69] Andre Renz, Swathi Krishnaraja, and Thomas Schildhauer. 2020. A new dynamic for edtech in the age of pandemics. In *Special Call for Contributions on Crisis-driven Innovation ISPIM 2020*, June 7-10, 2020, Virtual Event. ISPIM, 12 pages.
- [70] Radi Romansky. 2022. Digital age and personal data protection. *International Journal on Information Technologies & Security* 3, 14 (Jan. 2022), 89-100.
- [71] Steven M. Ross, Gary R. Morrison, and Deborah L. Lowther. 2010. Educational technology research past and present: Balancing rigor and relevance to impact school learning. *Contemporary Educational Technology* 1, 1 (Mar. 2010), 17-35. <https://doi.org/10.30935/cedtech/5959>
- [72] Richard M. Ryan, and Edward L. Deci. 2000. Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25, 1 (Jan. 2000), 54-67. <https://doi.org/10.1006/ceps.1999.1020>
- [73] Janet Salmons. 2015. *Qualitative Online Interviews* (2nd. ed.). SAGE, Thousand Oaks, CA.
- [74] Andreas Schleicher. 2020. *The Impact of COVID-19 on Education: Insights from Education at a Glance 2020*. OECD, Paris
- [75] Jillene G. Seiver and Alicia Troja. 2014. Satisfaction and success in online learning as a function of the needs for affiliation, autonomy, and mastery. *Distance Education* 35, 1 (Dec. 2014), 90-105. <https://doi.org/10.1080/01587919.2014.891427>
- [76] Kogilathah Segaran, Ahmad Z. M. Ali, and Tan W. Hoe. 2021. Does avatar design in

- educational games promote a positive emotional experience among learners?. *E-learning and Digital Media* 18, 5 (Feb. 2021), 422-440. <https://doi.org/10.1177/2042753021994337>
- [77] Ellen A. Skinner, and Michael J. Belmont. 1993. Motivation in the classroom: Reciprocal effect of teacher behavior and student engagement across the school year. *Journal of Educational Psychology*, 85, 4, 571-581.
- [78] Beata Souders. 2020. *Motivation in Education: What It Takes to Motivate Our Kids*. Positive Psychology. (Jan. 2020). Retrieved September 13, 2022 from <https://positivepsychology.com/motivation-education/>
- [79] Jerry C-Y. Sun, Pei-Hsun Hsieh. 2018. Applications of a gamified interactive response system to enhance the intrinsic and extrinsic motivation, student engagement, and attention of English learners. *Journal of Educational Technology & Society* 21, 3 (Jul. 2018), 104-116.
- [80] Marko Teras, Juha Suoranta, Hanna Teras, and Mark Curcher. 2020. Post covid-19 education and education technology ‘solutionism’: a seller’s market. *Postdigital Science and Education* 2, 1 (Jul. 2020), 863-878. <https://doi.org/10.1007/s42438-020-00164-x>
- [81] Hamid Tohidi, and Mohammad M. Jabbari. 2012. The effects of motivation in education. *Procedia-Social and Behavioral Sciences*, 31, 820-824. <https://doi.org/10.1016/j.sbspro.2011.12.148>
- [82] Torrey Trust. 2018. Why do we need technology in education?. *Journal of Digital Learning in Teacher Education* 34, 2 (Mar. 2018), 54-55. <https://doi.org/10.1080/21532974.2018.1442073>
- [83] Torrey Trust and Jeromie Whalen. 2021. K-12 teachers’ experiences and challenges with using technology for emerging remote teaching during the covid-19 pandemic. *Italian Journal of Educational Technology* 29, 2 (Apr. 2021), 10-25. <https://doi.org/10.17471/2499-4324/1192>
- [84] Selen Turkay and Sonam Adinolf. 2015. The effects of customization on motivation in an extended study with a massively multiplayer online roleplaying game. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace* 9, 3 (Oct. 2015), Article 2. <https://doi.org/10.5817/CP2015-3-2>
- [85] UCLA. *Statistical Consulting Group*. 2021. *SPSS FAQ: What does Cronbach’s Alpha*

Mean?. Retrieved September 15, 2022 from <https://stats.idre.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/>

- [86] Svein O. Ulstad, Hallgeir Halvari, Oystein Sorebo, and Edward L. Deci. 2016. Motivation, learning strategies, and performance in physical education at secondary school. *Advances in Physical Education* 6, 1 (Feb. 2016), 27-41. <https://doi.org/10.4236/ape.2016.61004>
- [87] Dimitrios Vlachopoulos. 2020. COVID-19: Threat or opportunity for online education?. *Higher Learning Research Communications* 10, 1 (Apr. 2020), 16-19. <https://doi.org/10.18870/hlrc.v10i1.1179>
- [88] Victor H. Vroom. 1964. *Work and motivation*. Wiley, New York.
- [89] Martin Weller. 2018. Twenty years of edtech. *Educause Review Online* 53, 4 (Aug. 2018), 34-48.
- [90] Welsh Government. 2019. *Computer says yes! New £50 million investment to transform edtech within all Welsh state schools*. (July 2019). Retrieved August 8, 2022 from <https://gov.wales/computer-says-yes-new-ps50-million-investment-transform-edtech-within-all-welsh-state-schools#:~:text=In%20the%20single%20biggest%20digital%20investment%20programme%20for,digital%20technology%20for%20teaching%20and%20learning%20in%20schools.>
- [91] Ben Williamson, Rebecca Eynon, and John Potter. 2020. Pandemic politics, pedagogies and practices: Digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology* 45, 2 (May 2020), 107-114. <https://doi.org/10.1080/17439884.2020.1761641>
- [92] Ben Williamson, Felicitas Macgilchrist, and John Potter. 2021. Covid-19 controversies and critical research in digital education. *Learning, Media and Technology* 46, 2 (May 2021), 117-127. <https://doi.org/10.1080/17439884.2021.1922437>
- [93] Zamzami Zainuddin. 2018. Students' learning performance and perceived motivation in gamified flipped-class instruction. *Computers & Education* 126, (Nov. 2018), 75-88. <https://doi.org/10.1016/j.compedu.2018.07.003>

Appendix

An Exploration into the Use of EdTech in Schools

PARTICIPANT INFORMATION SHEET

(Version 1.0, Date: 18/07/2022)

Project Title: An Exploration into the Use of EdTech in Schools

Contact Details:

Project Lead Contact: Laura Smith: 833411@swansea.ac.uk

Postgraduate Research Student, Faculty of Science and Engineering, Swansea University.

Project Supervisors:

Dr. Simon Robinson: s.n.w.robinson@swansea.ac.uk

Associate Professor, Computer Science, Faculty of Science and Engineering, Swansea University.

Dr. David Playfoot: d.r.playfoot@swansea.ac.uk

Senior Lecturer, Psychology, Faculty of Medicine, Health and Life Science

You are being invited to take part in some research. Before you decide whether or not to participate, it is important for you to understand why the research is being conducted and what it will involve. Please read the following information carefully.

What is the purpose of this research?

Given the rise of technology within the educational setting and its potential to supplement traditional teaching methods, it is important to understand student engagement with and motivation to use educational technology (EdTech) tools. This research aims to understand which EdTech features are perceived to be beneficial, improvements that can be made, ease of use, and the impact EdTech has on the learning of content. Furthermore, we would like to understand how EdTech can motivate students to engage in learning from the perspective of their teachers.

Why have I been asked to take part in the project?

You have been asked to participate in this project as you have been identified as a teacher who uses EdTech tools within your classroom.

What will happen if I take part?

If you agree to participate in this research, you will be asked a series of questions relating to your student's use of EdTech, their motivation to utilise these tools, and the impact EdTech can have on academic performance. Along with this, you will be asked to provide feedback on any EdTech features that you believe may enhance/hinder your student's motivation for using these tools and their overall learning.

Are there any risks associated with taking part?

There are no significant risks associated with participation.

Will my taking part in the project be kept confidential?

Your data will be processed in accordance with General Data Protection Regulation (GDPR). All data collected will be anonymised and will not be known to anyone outside of the research team. Any data that may reveal your identity will not be used in the writing up of the project.

Is participation voluntary and what if I wish to later withdraw?

Your participation is entirely voluntary – you do not have to participate if you do not wish to. All data collected will be anonymised and therefore, it will not be possible to remove data following submission. If you wish to withdraw, you will need to do so before submission at the end of this survey.

What are the possible benefits of taking part?

Through your participation, you will enable us to improve an EdTech platform, which will hopefully benefit your teaching and your students' learning experience.

What if I have any questions?

If there are any questions, please contact the research leads (details provided above).

Please note that taking part in this study is entirely voluntary, so you do not have to complete the questionnaire if you choose not to.

1. Which educational technology (EdTech) platforms do you use?

2. Which year groups do you teach?

- a. Year 1
- b. Year 2
- c. Year 3
- d. Year 4
- e. Year 5
- f. Year 6
- g. Year 7-9
- h. Year 10-11
- i. Year 12-13

3. Which subjects do you use EdTech for?

- a. Mathematics
- b. English
- c. Science
- d. ICT
- e. Languages
- f. History
- g. Geography
- h. Physical Education
- i. Design and Technology
- j. Other

4. How often do you ask your students to use EdTech?

5. How often do your students actually engage with EdTech?

6. How often do your students engage in EdTech for the purpose of self-learning?

7. When do your students engage in EdTech for the purpose of self-learning? (i.e., during school, at home, lunchtime, etc)

8. Do your students enjoy using Edtech for the purpose of learning?
- a. Yes
 - b. No

9. In your view, has EdTech resulted in an improvement in student grades? (If yes, what improvements have you seen? If not, why do you think there have been no improvements?)

10. Do you think your students understand curriculum/classroom content more following EdTech interaction?

11. Which EdTech features do you think are particularly useful for your students?

12. Which EdTech features are particularly useful for you as a teacher?

13. Which features do you think your students enjoy the most?

14. Are there any features that you find unhelpful or would like to see improved? If yes, could you provide details

15. Are there any features you feel EdTech does not currently have that you believe could be beneficial for learning? If so, what are they?

16. In your experience, are there any EdTech features that are better suited to older students than younger students? For example, any features that are either unsuitable or inaccessible for younger students due to a lack of comprehension.

17. Overall, what do you perceive to be the main benefits of using EdTech?

18. Overall, what do you perceive to be the main issues with using EdTech?

19. What do you believe motivates students to use EdTech?

20. What is your motivation for utilising EdTech tools within the classroom?

21. What do you believe would motivate students to use EdTech more in their learning?

22. If applicable, do you see difference levels of motivation to use EdTech across year groups?

23. Students' academic motivation:

	Not at all true	More not true than true	More true than not	Very much true
The students really try to learn using EdTech				
My students work at learning				

new things using EdTech.				
My students focus on assignments taught using EdTech.				
The students generally complete assignments and tasks that have been set using EdTech				
The students don't put much effort into content taught using EdTech.				
My students are often distracted when using EdTech				
In general, the students are genuinely interested in learning via EdTech tools.				
Generally, my students are unmotivated because their parents don't care about or value education				
When my students aren't engaged in school it is because they don't see the value of what they are being asked to learn.				

<p>If students aren't motivated to learn in my class, it is often because they don't have aspirations that connect to education, like plans to go on to college.</p>				
<p>Students often lack effort at school because they don't have support at home.</p>				
<p>If students don't see the point of learning the content, then they aren't motivated to learn it.</p>				
<p>Some of my students just have too many home problems to make school a priority.</p>				
<p>Most often, if students aren't engaged in my class, it's because they don't see the relevance of the content in their world.</p>				
<p>Some of my students aren't motivated to work in school because education has no place in the futures they see for themselves.</p>				

Generally, the students in my class who are not interested in learning are that way because of peer pressure to devalue school				
Most often, if students aren't working in my class, it's because they don't see how useful this information can be.				
Negative peer pressure is one big reason why some of my students are not motivated to learn in school				
Some students are not motivated to learn because they are just lazy.				
Some students in my class just don't care about learning—period.				

Thank you for taking part in this research!

DEBRIEF FORM

Project Title: An Exploration into the Use of EdTech in
Schools

Now that we've finished, let me explain the rationale behind this work.

The purpose of this study was to gather data on students' use of EdTech tools. Given the rise of technology within the educational setting, it is important to understand the uptake of EdTech within the student community, which features are perceived to be beneficial, which features require improvement, and whether students appear to have an easier time learning content that has been taught using EdTech. Moreover, we are trying to understand how EdTech can motivate students to engage in learning and which EdTech features motivate teachers to implement the use of this technology within their teaching.

Through the insights you have provided us, we hope to be able to improve existing EdTech platforms by introducing features that will motivate students' learning and ensure they are likely to engage with content on EdTech platforms.

I would like to reassure you that all information given in, and gained from, this study is completely confidential and will not be divulged outside of the confines of the research report. If you feel affected by issues raised by this research and would like to discuss any concerns, or if you have any further questions about the research, then please contact us:

Laura Smith: 833411@swansea.ac.uk

Dr. Simon Robinson: s.n.w.robinson@swansea.ac.uk

Dr. David Playfoot, d.r.playfoot@swansea.ac.uk

You can also contact Swansea University's well-being services, for advice: Wellbeing Services, Horton Building, Swansea University, Singleton Park, Swansea, SA2 8PP, Tel: 01792 295592, www.swansea.ac.uk/wellbeing/.

Thank you for your time.