University College Dublin

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What impact does the use of ICT have on the learning of students' in DEIS schools?

Submitted by:

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1.0 Chapter One - Introduction

1.1 Research topic

Information Communication Technology (ICT) has become an integral tool in classrooms to aid teaching and learning. This is evident through my observations on teaching placement, research, and the publication of policies such as the *Digital Learning Framework for Post Primary Schools* (Department of Education, 2017) and the *Digital Strategy for Schools 2015-2020* (Department of Education, 2015). This dissertation will highlight the benefits of ICT to aid student learning, for instance, how ICT can assist students' with additional educational needs (AEN) (DES,2015), allowing them to be inclusive classroom members (Cullen et al., 2012). Nonetheless, the challenges and difficulties incorporating ICT devices in education will be explored, such as teachers' insufficient competency in utilising ICT (Wastiau et al., 2013). To conclude, how these challenges can be overcome through increased funding and resources, as suggested by McAleavy et al. (2020) and the publication of guidelines surrounding screen time (Virgara et al., 2021), will be discussed. This research will focus specifically on schools that are part of the Delivering Equality of Opportunity in Schools Programme (DEIS). The DEIS initiative was launched by the Department of Education and Skills (DES) in 2005, with a reviewed plan published in 2017. The DEIS 2017 action plan aims to break the cycle of intergenerational disadvantage through education to create greater opportunities for at-risk students (DES, 2017). As stated in research by Smyth et al. (2014), students in DEIS schools have a greater complexity of need in comparison to non-DEIS schools. There is a higher prevalence of students' with AEN, lower levels of retention and achievement in State examinations, and students tend to come from households with lower levels of economic resources. To help alleviate this disadvantage, DEIS schools

are provided with additional grants, resources and curricular initiatives. (DES, 2017). This research will focus specifically on DEIS schools and how ICT can be a benefit or a disadvantage, and how these challenges can be overcome within a DEIS environment.

1.2 Why the research question is important to me

The research questions which will be explored throughout this dissertation are:

- The benefits of the use of ICT devices to aid student learning in DEIS schools.

- The challenges/disadvantages of ICT devices for student learning with a particular focus on DEIS schools.

- How these challenges can be overcome.

These research questions are important to me and my future teaching practice, as I have taught in both a DEIS tablet school and a non-DEIS, non-tablet school. As a result, I have witnessed how implementing ICT within the classroom can be challenging when students are not provided with adequate ICT devices such as tablets. I have also experienced the challenges which can arise in a DEIS tablet-based school. Due to the disadvantaged socio-economic status (SES) of many students, their broadband may be inadequate, or they may not be able to access an ICT device (Scully et al., 2021), which can make giving ICT based activities for homework unsuccessful. As I further develop my teaching practises, it is crucial to know whether the benefits of using ICT as a teaching and learning tool outweigh the negatives which can arise when ICT is implemented within a DEIS classroom. It is also pertinent that ways in which these challenges can be overcome are explored so that students and teachers can utilise ICT to aid student learning.

1.3 Policies impacting the research topic

Several policies will be referenced throughout this research, such as:

- *Digital Strategy for Schools 2015–2020: Enhancing teaching, learning and assessment.*

- *Inclusive Education Framework* (2011)*.*

- *Looking at our School 2016.*

- *Inclusive Education Framework* (2011)

- *Digital Learning Framework for Post Primary Schools* (2017)

1.4 Method

When conducting research for this study, the leading search terms used will be ICT, benefits, disadvantages, DEIS, and disadvantaged schools. The main focus of this research will be kept within the Irish context; however, research from other countries will be drawn upon to support the findings. Throughout the research process, a log will be kept to help keep account of what information has been found, what still needs to be explored and highlight questions that may arise. The research method for this study will focus on empirical research. The findings from the literature review will be brought into conversation with the reflections from year one and two of my Professional Masters of Education (PME) by exploring if they consolidate or contradict the experiences discussed within my reflections. The data set will be used in collaboration with the literature to see how problems that can arise in the classroom can be resolved through findings within the literature.

1.5 Structure of the dissertation

This dissertation will explore 'what impact does the use of ICT have on the learning of students' in DEIS schools?' Chapter one will identify the research topic, state the main research questions, identify policies that will be drawn on, and the methods used to conduct this research. Proceeding this, chapter two will discuss the benefits of ICT in DEIS settings such as, including students' with AEN in the mainstream classroom through research by Messenger-William & Marino (2010). The challenges of implementing ICT for student learning in disadvantaged settings will then be explored. The effects of screen time, insufficient ICT devices and teachers incompetences concerning implementing ICT will be commented on through research such as Owens & Weiss (2017) and Lucas et al. (2020). These challenges can be overcome by increased funding, as found by McAleavy et al. (2020) and incorporating initiatives to reduce screen time (Altenburg et al., 2016). Chapter three will bring into conversation my experiences and reflections while on placement throughout the PME and the findings from the literature review. The final chapter will comment on the benefits of practitioner research, consider what I have learned through the completion of the dissertation and the limitations of this study. This chapter will also discuss how the findings have shaped my thinking, the development of my practice and possible implications for school and policy.

2.0 Chapter Two - Literature Review

2.1 Introduction

This literature review will explore 'what impact does the use of ICT have on the learning of students' in DEIS schools?' It will do so by exploring research highlighting the benefits and negatives of using ICT devices within classrooms to aid student learning in DEIS schools. To conclude, how the challenges and disadvantages of using ICT devices within a DEIS school can be overcome will be discussed. Finally, there will be a brief summation of the topics examined throughout this literature review.

2.2   The benefits of utilising ICT devices within DEIS classrooms to aid student learning

2.2.1 Benefits of ICT devices for students' with additional educational needs

One of the main benefits which have arisen as a result of the introduction of ICT devices in classrooms is how it has made the differentiation of work more accessible for teachers (Karatza, 2019). ICT devices allow teachers to create a more inclusive classroom that can accommodate various learners' needs through differentiation (Messenger-William & Marino, 2010; Cullen et al., 2012). This is particularly beneficial for students with autism spectrum disorder (ASD) and students with AEN (DES, 2015). This is pertinent in DEIS schools as there is a higher prevalence of students with AEN in DEIS schools than in their non-DEIS counterparts (Nic Aindriú et al., 2020; McCoy et al., 2016; Cullinan et al., 2014;2015; Banks et al., 2012). Research by Odom et al. (2015) found that there has been a significant increase in the use of ICT in teaching strategies for students with ASD. As established in research by Coyne et al. (2015), ICT can make the curriculum more accessible through multimedia and interactivity, supporting learners' with AEN academic development. The use of ICT devices in classrooms can also aid students' with ''accessibility issues such a

visual impairments'' (Marcus -Quinn et al., 2019, pg. 774). This is particularly beneficial in a DEIS school setting as students who attend these schools are more likely to have physical/sensory disabilities than their peers. (Smyth et al., 2015). As stated by Thomas (2021), ICT devices facilitate students with AEN to complete tasks precisely and at the same rate as their peers, resulting in them feeling equal to their classmates and an inclusive member of the classroom community. This is especially important as the DES has aimed to move away from having students' with AEN in special schools and include and integrate these students into mainstream classrooms (Howe & Griffin, 2020; MacGiolla Phádraig, 2007). This is reinforced in the *Education for Persons with Special Educational Needs Act 2004 (EPSEN),* (EPSEN, 2004) and the *Inclusive Education Framework* (National Council for Special Education, 2011), which state the importance of students with AEN being educated in an inclusive environment with their peers in a mainstream classroom. The value of ICT to ensure an inclusive classroom is also stated in the *European Framework for the Digital Competence of Educators* (Redecker, 2017). Therefore, as DEIS schools are more disposed to use ability streaming and to have special classes (Smyth et al., 2015), it can be argued that the implementation of ICT devices could help DEIS schools move away from ability grouping and create more inclusive classrooms.

2.2.2 Benefits of ICT to aid student engagement

One of the aims of the DEIS Plan 2017 is to improve student outcome, which can be achieved through increasing student engagement in school concerning student attendance, retention, and engagement in class (DES, 2017). Research by Karatza (2019) highlights how the use of ICT within classrooms accommodates students' independence and sense of control over their learning, which can retain student engagement. As stated in the *Digital Learning Framework for Post Primary Schools* (DES, 2017) and the *Digital Learning Planning*

Guidelines (DES, 2018), student-centred environments can be created through ICT implementation. A student-centred setting is linked to higher levels of motivation, engagement (Balanskat et al., 2006) and lower levels of absenteeism amongst boys (Smit et al., 2014). This is particularly beneficial for DEIS schools as research by Smyth et al. (2015) found that in streamed settings, which many DEIS schools still operate by, students in lower-achieving classes tend to misbehave more and have a negative attitude towards school. Smyth (2017) and Smyth et al. (2007) found that students who have high incidences of negative engagements within a school are more likely to disengage. The use of ICT also allows the teacher to create a more student-centred environment by taking a facilitator role (Kundu, 2018; Radhakrishnan et al., 2018) and allowing students to participate in more independent inquiry-based learning. The importance of a student-centred environment is emphasised in *Looking at our School 2016* (The Inspectorate DES, 2016), as it increases student engagement and academic achievement (Buckner & Kim, 2014). This is particularly beneficial for DEIS schools where student attainment in State examinations is still lower than their peers (McAvinue & Weir, 2015). Therefore, the use of ICT as a teaching and learning tool can be of particular benefit in a DEIS setting to keep students engaged (Barley et al., 2002) and, as a result, improve attendance and academic achievement (Miranda-Zapata et al., 2018).

2.3   The challenges/disadvantages of implementing ICT for student learning in DEIS schools

2.3.1 The effects of increased screen time on students

Several challenges and disadvantages can arise when it comes to using ICT in schools. Increased screen time can affect students' well-being and increase sleep problems (Marcus – Quinn et al., 2019; Stiglic & Viner, 2019), negatively affecting academic

performance (Owens & Weiss, 2017). This is particularly problematic for students who attend DEIS schools, where some pupils may be homeless or living in poverty (Ó Ríordáin et al.

2015), as there is a correlation between low SES and poor academic achievement (Weir et al., 2015). Increased screen time can also result in students being less involved in physical activity (PA) and becoming more sedentary (Júdice et al., 2021); this is linked to an increased incidence of obesity (Shin, 2018) which can contribute to lower adult educational attainment (French et al., 2018). Therefore, this may be heightened for students who attend DEIS schools as the rate of progression to third-level education from DEIS schools is significantly lower than non- DEIS environments (The Inspectorate DES, 2015). Childhood obesity is also more prevalent in low SES environments (O'Brien et al., 2021). Hankonen (2017) found that students from low SES backgrounds had less opportunity to engage in PA due to lack of money and equipment. Therefore, it can be argued that the impacts of screen time on activity levels in children may be exacerbated by living in a disadvantaged setting. This is problematic for the well-being of students from underprivileged households, as *The National Guidelines on Physical Activity for Ireland* (Department of Health and Children and The Health Service Executive, 2009) highlights the importance of PA for young people, recommending that all young people should engage in 60 minutes of moderate to vigorous physical activity a day.

2.3.2 Insufficient access to ICT devices and poor broadband connection

The importance of using ICT to help address educational disadvantage is stated in the *Smart Schools=Smart Economy Report* (DES & ICT Ireland, 2009) and the *Report on Review of DEIS* (DES Social Inclusion Unit, 2017). This is also reflected in policy; the *Digital Strategy for Schools 2015-2018* describes ICT as a critical enabler for students at risk of educational disadvantage (DES, 2015). However, many students from low SES backgrounds

have difficulties accessing devices and, in numerous cases, also lack access to a sufficient broadband connection compared to their non-DEIS peers. (Hash, 2021; Scully et al., 2021; Mohan et al., 2020; The Inspectorate Department of DES, 2020). This became particularly evident during remote learning due to Covid-19. Research by Lucas et al. (2020) found that disadvantaged pupils with limited broadband access were less engaged in remote learning than their peers. Findings from the *Growing Up in Ireland Key Findings: Special Covid-19 Survey* state that disadvantaged students had experienced the highest level of learning loss during remote learning due to insufficient access to broadband and ICT devices (Growing Up in Ireland, 2021). The *Growing Up in Ireland Key Findings: Special Covid-19 Survey* also highlighted the need for additional differentiated support for these students to try and diminish the effects of this learning gap when the schools reopen. It is pertinent that this learning gap is addressed to avoid it widening further, as prior to the closure of schools due to Covid-19, the academic attainment of disadvantaged students was persistently lower than their peers (National Anti-Poverty Strategy, 2002).

2.3.3 The knowledge and competence of teachers concerning ICT

Teachers' reluctance (Basak & Govender, 2015), lack of time and competency to incorporate ICT into their teaching and learning was also a challenge when using ICT devices within the classroom (Lawrence and Tar, 2018; Ghavifekr et al.,2016; Bingimlas, 2009;).

Prieto - Rodriguez (2016) discovered that teachers' reluctance in implementing ICT emerged from teachers' beliefs that it was difficult and time-consuming, and they were already under time constraints within their class time and workload. This workload is heightened in a DEIS school setting as teachers are expected to produce good academic results while also teaching in a community that is at a disadvantage and has social challenges, which must be considered when teaching students from these backgrounds (Burns, 2015). The lack of education

concerning ICT use in student-teacher and in-service teacher training was also an issue (McCoy & Lyons, 2018; Unal & Ozturk, 2012). Findings by Bryant et al. (2020) highlight how students only achieve better academic standards through ICT when their teachers are adequately trained and have the time to utilise ICT to its full potential. This highlights the need for sufficient training in ICT for student teachers, as there is a higher percentage of newly qualified teachers in DEIS than non-DEIS schools (Smyth et al.,2015). Research by McGarr & McDonagh (2021) found a wider gap than anticipated between the presumed skills of student teachers and their actual competencies. There is also no correlation between age and ICT competency (Starkey, 2020). Research has established that student teachers are not adequately trained in implementing ICT in their teaching practice (Wastiau et al., 2013; Starkey, 2010; Enochsson & Rizza, 2009). Researchers discovered that when ICT for pedagogy is incorporated into their initial teacher training, educators are more inclined to frequently integrate ICT into their students' learning (OECD, 2020). Cosgrove et al. (2019) discovered that after attending a seminar on implementing the *Digital Learning Framework* (DLF) (DES, 2017), teachers reported that their confidence and knowledge regarding the DLF increased. These findings highlight the need for ICT skills to be integrated across all modules within teacher training and the benefits of greater in-service training.

2.4 How these challenges can be overcome

2.4.1 Having initiatives to reduce students' screen time

As discussed in section 2.3.1, one of the disadvantages of using ICT devices within schools is the adverse effects of high levels of screen time. This can result in students becoming overtly sedentary (Marttinen et al., 2017) and negatively affecting students' learning (Trinh et al., 2015). Research by Altenburg et al. (2016) found that interventions such as having movement breaks during class times, having standing desks in designated

classrooms, and teachers encouraging initiatives such as TV turnoff weeks could reduce the negative health effects of sedentary behaviour in adolescents. This is particularly beneficial for DEIS students as Buchanan et al. (2016) found that interventions may reduce the predominance of obesity in children from low SES communities. Research has shown screen time levels of adolescents increase as they get older (Thomas et al., 2020). This negatively impacts post-primary DEIS students as children from low-income families statistically have a higher exposure to screen time than their peers (O'Brien et al., 2021). The Irish Government recently released recommendations on how parents can keep their child's screen time levels down during Coronavirus (Government of Ireland, 2020). Arguably, this is not enough; a study in Australia has drawn up the first national PA and screen time guidelines for Outside School Hours Care (OSHC) practices to help restrict screen time for children who attend OSHC (Virgara et al., 2021). It can be concluded that guidelines such as the OSHC could be developed for schools to help ensure that students are not exposed to excessive levels of screen time.

2.4.2 Improving access to sufficient broadband and ICT devices

One of the main challenges teachers and students face when incorporating ICT devices to aid student learning is the absence of high-speed broadband within students' homes from low SES backgrounds (Chen & Li, 2021). During the closure of schools due to Coronavirus, many students could not engage with online learning because of insufficient ICT devices and poor internet access (Growing Up in Ireland, 2021). The Irish government has funded the National Broadband Plan development, which will see higher-speed broadband services to 695 schools and 1.1 million people by 2022 (Department of Communications, Climate Action and the Environment, 2020). This will significantly benefit students in disadvantaged households whose broadband may be lacking. The coordinators

have stated that this project is collaborating with the DES, who will ensure that schools in deprived areas will prioritise (Department of Communications, Climate Action and the Environment, 2020). However, even if there is access to broadband in underprivileged communities, often for residents in at-risk households, broadband is not affordable. To overcome this, several countries have collaborated with broadband providers to create public-private partnerships to lower broadband costs for disadvantaged communities (Kelley

& Sisneros, 2020). Students in underprivileged households are also less likely than their peers to have access to ICT devices (Thomson, 2020). In light of Coronavirus, some governments have taken action to reduce this discrepancy by giving ICT devices on loan to students in disadvantaged communities so that they can engage with remote learning. Germany has allocated €150 to each family in need, to assist in purchasing ICT devices for online learning (McAleavy et al., 2020). In Ireland, there is still an attainment gap between disadvantaged students and their peers (Weir & Kavanagh, 2018); it can be argued that the Irish Government, beyond the pandemic, can implement initiatives such as these to help alleviate this educational gap.

2.4 Summation

This literature review has examined the benefits and challenges ICT devices can have on student learning in DEIS schools. Benefits such as the ability to create an inclusive classroom, particularly concerning students who have ASD, and the facilitation of student-centred learning environments has been discussed by Cullen et al. (2012) and Buckner & Kim (2014). The challenges teachers face in implementing ICT devices in DEIS schools, such as students becoming overly passive, limited access to broadband and lack of teaching training in ICT, have been commented on through findings by Júdice et al. (2021), Hash (2021) and Wastiau et al. (2013). To conclude, the literature review has explored how

these challenges can be overcome through initiatives to reduce screen time, as supported by Buchanan et al. (2020) and McAleavy et al. (2020) comments on how government funding can help provide broadband and ICT devices to disadvantaged students.

3.0 Chapter Three - Reviewing my practice through the lens of the literature review.

3.1 Context

In this chapter, I will be reviewing my practice through the lens of the literature review. The data set that will be used will be the reflections and evaluations I have accumulated from my year one and two of PME placement. My first year of placement was completed in School A; this is a mixed, Vocational, non-tablet secondary school. Currently, I am teaching in School B; this is a mixed DEIS tablet school. I have taught English and Civic, Social and Political Education (CSPE) in both schools. I have consistently reflected on my classes throughout my teaching practice, documenting what went well, not so well and what I would do differently. In my reflections, I have commented on how ICT has helped or hindered teaching and learning within my classroom. Having taught in two entirely different schools, in terms of ICT usage and DEIS and non-DEIS status, has allowed me to collect data that I can use to position myself on either side of the discussion regarding both the positive and negative effects of ICT devices on teaching and learning.

3.2 ICT supporting the inclusion of students' with AEN in the mainstream classroom

As CSPE is a non-exam subject, I have observed throughout my placement that students' with AEN are taken at this time for resource classes. This deprives these students of experiencing these subjects, which I believe are vital in providing a rounded education. This removal from the class further isolates these students from their classmates and excludes them from particular subjects. It can be argued that this contradicts the aims of the *EPSEN Act 2004,* which states that students with AEN should be educated in mainstream classrooms

where possible (EPSEN, 2004). While on placement in School B, which as a DEIS school has a higher prevalence of students with AEN (Nic Aindriú et al., 2020; McCoy et al., 2016; Cullinan et al., 2014;2015; Banks et al., 2012), I have been able to provide resources for students with AEN to make the material being covered in class more accessible. As Coyne et al. (2015) found, I have achieved this by using ICT devices to create visuals and interactive tasks. This has been of particular benefit in teaching a student who has ASD poetry in my English class; this student interprets poetry in a very literal manner and struggled with answering poetry questions. This resulted in her resource teacher having to spend a lot of time with her on poetry during resource hours. Using ICT in the mainstream classroom to create visuals that depict deeper and alternative meanings of poems has increased this students' understanding of poetry and has resulted in less time having to be allocated to poetry in her resource class. Therefore, I conclude that if ICT devices were used to their full potential by teachers to ensure that class material is differentiated to accommodate all learners, AEN students would need to be removed from the mainstream classroom for less time.

3.3 Mobile phones versus tablets

During my first year on placement, I was teaching in School A, a non-tablet school. Throughout the year, I had endeavoured to ensure that the methodologies that I was using to teach the students were student-centred and promoted the students to engage in independent research-based learning. In many classes, particularly CSPE, I would have activities planned, such as getting the students to do projects in which they had to research the 17 sustainable development goals or use Mentimeter to share their ideas. The school allowed the students to use their phones for academic purposes. However, often not all students would have their phones with them or have sufficient internet access. It was also difficult to monitor what the

students were doing on their phones and ensuring that they were staying on task, as the screens were so small, and it was easy for them to access social media applications. Therefore, student-centred and research-based learning was not always successful and came with many obstacles as the students were not provided with ICT devices. In contrast, in School B, a tablet school, the same issues with the junior cycle students do not apply as they must have a tablet device in class at all times. As Kundu (2018) and Radhakrishnan et al. (2018) state, ICT has allowed me to take a facilitator role and engage the students in student-centred independent research learning. As Karatza (2019) found, this helps me keep the students involved in their learning. This is particularly valuable when teaching in a DEIS school, as in line with Barley et al. (2002), I found that student engagement in School B was poor compared to School A.

3.4 Navigating the negatives

While there are many positives, some negatives are associated with using ICT devices in schools, as explored in section 2.3. As found in research by Marcus – Quinn et al. (2019), increased screen time can affect students' well-being. Júdice et al. (2021) stated that students are becoming more sedentary and less engaged in PA because of increased screen time. These findings align with my observations on placement while on lunchtime supervision. During this time, I have observed that many students are inclined to spend their lunchtime on their own devices rather than socialising or participating in games with their peers. From conversations with other teachers, they remarked on how since ICT devices have been introduced into the school, students are becoming increasingly content to spend their lunchtime inside on their devices rather than socialising with friends. Several staff members also voiced that they believe break times should be made device-free zones to reduce students' screen times outside the classroom, encouraging them to be more social with their

peers and participate in PA during break time. This may be very beneficial as Alentburg et al. (2016), and Buchann et al. (2016) both found that introducing initiatives like these can reduce screen time and increase PA in children. Having students from low SES backgrounds engage in PA within the school is crucial. Research by Hankonen (2017) found that students from low- SES communities are less likely than their counterparts from more privileged backgrounds to engage in PA independent of their school due to lack of financial resources and equipment. Reducing screen time and PA is an issue that DEIS schools need to be conscious of, as a lack of PA and being sedentary is linked to increased levels of obesity (Shin, 2018), which is more pertinent in disadvantaged communities (O'Brien et al., 2021).

3.5 The need for sufficient ICT devices and broadband access

It was not until 2019 that School B became a tablet school, and therefore, several students in my fifth-year group do not have access to an ICT device. In line with Scully et al. (2020) and Mohan et al. (2020), I have observed that due to the low SES background of many of the students in this school, numerous students have limited access to ICT devices at home and have poor broadband connectivity. I have found that this can limit the methodologies used with this class and make giving research-based tasks very difficult. This also made the recent remote learning period with this class very challenging and impossible for some students. Students who did not have access to an ICT device were forced to attend Google Meet classes and complete activities through their mobile phones. Due to the small screen size, this was very difficult and resulted in many of my students disengaging from remote learning completely. Unsatisfactory internet access was also an issue for numerous students, and as a consequence, students missed part or all of several online classes. In line with findings in the *Growing Up in Ireland Key Findings: Special Covid-19 Survey,* I have found that since returning to the classroom, these students have experienced a more significant

learning loss than their peers who could engage with online learning (Growing Up in Ireland, 2021).

3.6 The need for greater ICT training

The recent Covid 19 pandemic has highlighted how even in schools such as School B, which are tablet-based schools, teachers have not utilised ICT devices to their full potential. In a staff meeting before the commencement of online learning, many teachers voiced concerns regarding not feeling competent with ICT as they had never received any training in relation to utilising ICT for teaching and learning. Byrant et al. (2020) highlight the importance of sufficient teacher training to ensure that ICT is beneficial to students' academic achievement. From my own experience, I found that my reluctance with using ICT in my teaching stemmed from my lack of experience with using it within the classroom. In my early days as a student teacher, I found it challenging to incorporate new methodologies which I was being taught in UCD into my teaching, as I was inclined to teach how I remembered being taught myself. Research by Wastiau et al. (2013) states that student teachers do not receive sufficient ICT training in their teacher education. I feel I would have benefited greatly from having modules that explain how ICT can be utilised to its full potential for teaching and learning within the classroom. This would have been particularly useful during the transition to online learning.

3.7 Summation

Throughout my time on placement, I have experienced both the positives and challenges of using ICT devices as a teaching and learning tool. In line with Coyne et al. (2015) findings, ICT has allowed me to create visuals and interactive tasks for students' with AEN to facilitate their learning in the mainstream classroom. In School B, students have

constant access to ICT devices which, in line with findings by Radhakrishnan et al. (2018), I found makes student-centred activities and research-based learning much more accessible. Nonetheless, I have also witnessed the negatives that can occur due to ICT usage, which can be particularly prevalent in low SES schools. In agreement with Júdice et al. (2021), I have observed that students are engaging in high levels of screen time and, as a consequence, have little involvement in PA, impacting negatively on students' health, as stated by Shin (2018).

4.0 Chapter Four - Concluding chapter

This chapter will reflect on what I have learned through my literature review and analysis of my reflections and observations relating to the benefits and challenges of ICT devices in teaching and learning in DEIS schools through practitioner research. This chapter will acknowledge the limitations of this research. This chapter will also comment on how the research has shaped my thinking, influenced my future teaching practice and how the benefits, challenges and means of overcoming these issues in implementing ICT in DEIS schools could impact schools and policy.

4.1 What I have learned through my review and analysis of my practice relating to my research topic through practitioner research

Through the completion of this dissertation, the benefits of practitioner research have become apparent. Practitioner research has allowed me to evaluate my practice; through this, I have been able to identify where I can improve my practice concerning implementing ICT in disadvantaged settings. It has enabled me to carry out specific, highly relevant research embedded within my practice and collect rich data to inform my analysis from my teaching experience. Through practitioner research, this dissertation explored 'what impact does the use of ICT have on students' learning in DEIS schools?' As a consequence of my research, I have learned that there are numerous benefits to implementing ICT devices in DEIS schools. Such as ICT's ability to aid students' with AEN in being inclusive members of the mainstream classroom through differentiation (Karatza, 2019) and interactivity (Coyne et al., 2015). However, from the literature and my observations, I have learned that overexposure to screen time can affect students' well-being (Stiglic & Viner, 2019). Remote learning due to Coronavirus has also highlighted how students from disadvantaged backgrounds may experience a greater learning loss than their peers (*Growing Up in Ireland*, 2021) due to lack

of access to ICT devices and broadband (Hash, 2021). Nonetheless, research has shown that these challenges can be overcome through initiatives to reduce screen time (Altenburg et al.,2016) and government funding to provide broadband and ICT devices to disadvantaged students (McAleavy et al., 2020). It can be concluded that the benefits of using ICT in DEIS schools outweigh the challenges, as the literature has proven that these disadvantages can be overcome once sufficient measures are put in place.

4.2 Limitations

This dissertation has several limitations which need to be acknowledged. This dissertation has been restricted to a 6000 word count and a deadline for completion, which confined the extent of the research. Studies into the effects of ICT in schools in an Irish context were narrow; therefore, International studies were drawn upon to inform this dissertation. The research for this study was also limited to empirical research; no surveys or interviews could be conducted as data for this research, which confined the data to my reflections from year one and two of my PME. My reflective data was also limited to comparing a tablet using DEIS post-primary school and non-tablet Vocational secondary school. A richer comparison may have been ascertained if the data was commenting on a tablet using DEIS and non-DEIS status school.

4.3 How this research has shaped my thinking

The research which has informed this dissertation has shaped my thinking concerning students' accessibility to ICT devices and ample broadband and how this can affect their learning. This is a particular concern for DEIS students, as stated by Chen & Li (2021) and Thomson (2020); students from underprivileged backgrounds are less likely than their peers to have access to ICT devices or broadband. These issues were exasperated during remote

learning. Many students did not have access to an ICT device or adequate broadband to attend online classes (Growing Up in Ireland, 2021). Prior to these findings, I would have taken for granted that students had access to these amenities at home. However, I now understand that if I ask students to engage with work that requires ICT devices and a broadband connection, an alternative option needs to be provided. This will ensure students are not placed in a position where they cannot engage in their learning due to reasons outside of their control. This research and my reflections have also made me realise the need for a balanced approach to the level of screen time students are exposed to. As highlighted in section 2.3.1, excessive screen time can affect students' health (Shin, 2018) and academic achievement (Owens and Weiss, 2017); this has made me rethink the level of screen time my students are exposed to during my classes.

4.4 Possible directions for the development of my practice

The completion of this dissertation has prompted me to reflect on my current teaching practices and how they can be improved in light of the findings from this research. Throughout my teaching career, I will continuously be conscious of the importance of using ICT devices to ensure that they are being used to facilitate the optimum level of teaching and learning. To ensure that my teaching practices and methodologies are relevant and engaging, I will continue to educate myself and enrol in in-service training. Byrnat (2020) highlights the importance of in-service education, stating that ICT will only help improve students' academic achievements if their teachers are trained and fully competent in using ICT and utilising it to its full potential. The research drawn upon for this dissertation highlighted the benefits of ICT for facilitating research-based, student-centred learning, which is stressed in studies by Kundu (2018) and Radhakrishnan (2018). This is something that I will implement throughout my teaching practice as Buckner and Kim (2014) concur that inquiry-based

learning increases students' engagement in their education, particularly in disadvantaged settings (Barley et al., 2002).

4.5 Possible implications for school and policy

As the literature in this dissertation has attested, there are also several negatives to using ICT devices, as outlined in 2.3. The problems associated with increased screen time, as discussed in 2.3.1, may need to be addressed in schools and at a policy level. Schools may need to introduce initiatives such as lunchtimes being a tablet free zone as suggested by Altenburg et al. (2016) and place greater emphasis on PA to encourage students to take a break from their devices. This is of particular concern in DEIS school contexts, as Hankonen (2017) has stated that children from low socioeconomic backgrounds are less motivated than their peers to participate in sports, which increases their risk of becoming obese (Shin, 2018). Policymakers may have to consider guidelines and policy for management and teaching staff concerning ICT training and how to implement ICT into the school community. Research by Bryant et al. (2020), highlights how through ICT, student attainment increases if teachers are sufficiently trained in how to best implement ICT to aid student learning.

4.6 To conclude

This dissertation aimed to explore 'what impact does the use of ICT have on the learning of students' in DEIS schools?' This has been achieved through the research process and reflection on my own experiences from year one and two of my PME. From my research, the benefits of ICT in aiding student learning in DEIS schools have been identified. ICT can aid in the inclusion of students with AEN into the mainstream classroom (Cullen et al., 2012). ICT can also assist in engaging students with their learning by creating student centred environments (Radhakrishnan et al., 2018). This is pertinent in DEIS schools as there are

higher levels of students with AEN needs (Nic Aindriú et al., 2020) and lower academic attainment in State examinations (McAvinue & Weir, 2015). However, some negatives can arise from utilising ICT in the classroom, such as insufficient access to ICT devices and broadband (Scully et al., 2021) and students becoming sedentary (Júdice et al., 2021). These negatives can be exasperated in DEIS settings as students from disadvantaged households have fewer opportunities to engage in sport than their peers (Hanoken, 2017). Nonetheless, these challenges can be overcome through initiatives such as movement breaks (Altenburg et al., 2016) and increased funding (McAleavy et al., 2020). Therefore, it can be argued that the benefits of implementing ICT in DEIS schools for student learning are more significant than the disadvantages, as these challenges can be overcome once sufficient measures are implemented. Concluding that ICT has a positive impact on the learning of students' in DEIS schools, once it is implemented correctly.

5.0 Bibliography

Altenburg, T. M., Kist-van Holthe, J., & Chinapaw, M. J. (2016). Effectiveness of intervention strategies exclusively targeting reductions in children's sedentary time: a systematic review of the literature. *International Journal of Behavioral Nutrition and Physical Activity*, *13*(1), 1-18.

Balanskat, A., Blamire, R., & Kefala, S. (2006). The ICT impact report. *European Schoolnet*, *1*, 1-71.

Banks, J., Shevlin, M., & McCoy, S. (2012). Disproportionality in special education: Identifying children with emotional behavioural difficulties in Irish primary schools. *European Journal of Special Needs Education*, *27*(2), 219-235.

Barley, Z., Lauer, P. A., Arens, S. A., Apthorp, H. A., Englert, K. S., Snow, D., & Akiba, M. (2002). Helping At-Risk Students Meet Standards: A Synthesis of Evidence-Based Classroom Practices.

Basak, S. K., & Govender, D. W. (2015). Development of a conceptual framework regarding the factors inhibiting teachers successful adoption and implementation of ICT in teaching and learning. *International Business & Economics Research Journal (IBER)*, *14*(3), 431-438.

Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, science and technology education*, *5*(3), 235-245.

Bryant, J., Child, F., Dorn, E., & Hall, S. (2020, June 12). *New global data reveal education technology's impact on learning*. McKinsey and Company. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/new-global-data-reveal-education-technologys-impact-on-learning

Buchanan, L. R., Rooks-Peck, C. R., Finnie, R. K., Wethington, H. R., Jacob, V., Fulton, J. E., ... & Community Preventive Services Task Force. (2016). Reducing recreational sedentary screen time: a community guide systematic review. *American Journal of Preventive Medicine*, *50*(3), 402-415.

Buckner, E., & Kim, P. (2014). Integrating technology and pedagogy for inquiry-based learning: The Stanford Mobile Inquiry-based Learning Environment (SMILE). *Prospects*, *44*(1), 99-118.

Burns, G. (2015, December). Challenges for Early Career Teachers in DEIS Schools. Joint Conference: INTO and Education Disadvantage Centre, St Patrick's College, Drumcondra, Dublin. Retrieved from http://www. into. ie/ROI/NewsEvents/Conferences/ConferenceonEducationalDisadvant age2015/Burns_EdConf2015. Pdf.

Chen, W., & Li, X. (2021). Digital inequalities in American disadvantaged urban communities: access, skills, and expectations for digital inclusion programs. *Information, Communication & Society*, 1-18.

Cosgrove, J., Moran, E., Feerick, E., & Duggan, A. (2019). *Digital Learning Framework (DLF) national evaluation- starting off: Baseline report.* Dublin: Educational Research Centre.

Coyne, B., Devitt, N., Lyons, S., & McCoy, S. (2015). Perceived benefits and barriers to the use of high-speed broadband in Ireland's second-level schools. *Irish Educational Studies*, *34*(4), 355-378.

Cullen, K., McAnaney, D., Dolphin, C., Delaney, S., & Stapleton, P. (2012). Research on the provision of Assistive Technology in Ireland and other countries to support independent living across the life cycle. *Work Research Centre, Dublin*.

Cullinan, J., Nolan, B., & Lyons, S. (2014;2015;). In John Cullinan, Seán Lyons and Brian Nolan(Eds.), *The economics of disability: Insights from irish research.* Manchester University Press.

Department of Communications, Climate Action and the Environment. (2020, June 17). *National Broadband Plan.* gov.ie. https://www.gov.ie/en/publication/c1b0c9-national-broadband-plan /

Department of Education and Science & ICT Ireland. (2009). *SMART SCHOOLS=SMART ECONOMY Report of the ICT in Schools Joint Advisory Group to the Minister for Education and Science.* https://www.education.ie/en/Publications/Policy-Reports/Smart-Schools=Smart-Econ omy.pdf

Department of Education and Skills. (2015). *Digital Strategy for Schools 2015–2020: Enhancing teaching, learning and assessment.* https://www.education.ie/en/Publications/Policy-Reports/Digital-Strategy-for-School s -2015-2020.pdf

Department of Education and Skills. (2017). *DEIS Plan 2017, Delivering Equality of Opportunity in Schools.*

https://www.education.ie/en/publications/policy-reports/deis-plan-2017.pdf

Department of Education and Skills. (2017). *Digital Learning Framework for*

Post-Primary

*Schools.*https://www.pdsttechnologyineducation.ie/en/Planning/Digital-Learning-Framework-and-Planning-Resources-Post-Primary/Digital-Learning-Framework-for-Post

-Primary-Schools.pdf

Department of Education and Skills. (2018). *Digital Learning Planning Guidelines*.

https://www.pdsttechnologyineducation.ie/en/Planning/Digital-Learning-Planning-Gu idelines.pdf

Department of Education and Skills Social Inclusion Unit. (2017) *Report on the review of DEIS.*

https://www.education.ie/en/Schools-Colleges/Services/DEIS-Delivering-Equality-of- Opportunity-in-Schools-/DEIS-Review-Report.pdf

Department of Health and Children, The Health Service Executive. (2009). *The National Guidelines on Physical Activity for Ireland.*

https://www.ncn.ie/images/GuidelinesPhysicalActivity.pdf

Education for Persons with Special Educational Needs Act, (2004).

https://data.oireachtas.ie/ie/oireachtas/act/2004/30/eng/enacted/a3004.pdf

Enochsson, A.B., & Rizza, C. (2009). *ICT in Initial Teacher Training: Research Review. (*OECD Education Working Papers, No. 38). OECD Publishing, Paris.

https://doi.org/10.1787/220502872611.

French, S. A., Wall, M., Corbeil, T., Sherwood, N. E., Berge, J. M., & Neumark‑Sztainer, D. (2018). Obesity in adolescence predicts lower educational attainment and income in adulthood: the Project EAT longitudinal study. *Obesity*, *26*(9), 1467-1473.Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. *Malaysian Online Journal of Educational Technology*, *4*(2), 38-57.

Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. *Malaysian Online Journal of Educational Technology*, *4*(2), 38-57.

Government of Ireland. (2020, April, 22). *Let's Play Screen Time.*
gov.ie. https://www.gov.ie/en/publication/lets-play-screen-time/

Growing Up in Ireland. (2021). *Growing Up in Ireland Key Findings: Special Covid-19
Survey.* ERSI; Trinity College Dublin; Department of Children, Equality,
Integration and Youth. https://www.growingup.ie/pubs/Covid-KF_Web-ready.pdf.

Hankonen, N., Heino, M. T. J., Hynynen, S., Laine, H., Araújo-Soares, V., Sniehotta, F.
F., Vasankari, T., Sund, R., & Haukkala, A. (2017). Randomised controlled
feasibility study of a school-based multi-level intervention to increase physical
activity and decrease sedentary behaviour among vocational school students. *The
International Journal of Behavioral Nutrition and Physical Activity, 14*(1), 37-37.
https://doi.org/10.1186/s12966-017-0484-0

Hash, P. M. (2021). Remote learning in school bands during the COVID-19 shutdown.
Journal of Research in Music Education, *68*(4), 381-397.

Howe, C., & Griffin, C. (2020). Is Ireland at a Crossroads of Inclusive Education?. *REACH:
Journal of Inclusive Education in Ireland*, *33*(1), 44-56.

Júdice, P. B., Magalhães, J. P., Rosa, G. B., Henriques-Neto, D., Hetherington-Rauth, M., &
Sardinha, L. B. (2021). Sensor-based physical activity, sedentary time, and reported
cell phone screen time: A hierarchy of correlates in youth. *Journal of sport and
health science*, *10*(1), 55-64.

Karatza, Z. (2019). Information and Communication Technology (ICT) as a Tool of
Differentiated Instruction: An Informative Intervention and a Comparative Study
on Educators' Views and Extent of ICT Use. *International Journal of Information
and Education Technology*, *9*(1), 8-15.

Kelley, B., & Sisneros, L. (2020). Broadband Access and the Digital Divides. Policy Brief.
Education Commission of the States.

Kundu, A (2018) A Study on Indian Teachers' Roles and Willingness to Accept Educational
Technology. *International Journal of Innovative Studies in Sociology and
Humanities (IJISSH)*, 3(9), 42–52.
https://www.researchgate.net/profile/Arnab-Kundu-3/publication/327672021_A_Stud
y_on_Indian_Teachers%27_Roles_and_Willingness_to_Accept_Educational_Technol

ogy/links/5b9e06cfa6fdccd3cb5a7e96/A-Study-on-Indian-Teachers-Roles-and-Willi
n gness-to-Accept-Educational-Technology.pdf

Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and
integration of ICT in teaching/learning process. *Educational Media
International*, *55*(1), 79-105.

Lucas, M., Nelson, J., & Sims, D. (2020). Schools' responses to Covid-19: Pupil engagement
in remote learning. *National Foundation for Educational Research.*

MacGiolla Phádraig, B. (2007). Towards inclusion: The development of provision for
children with special educational needs in Ireland from 1991 to 2004. *Irish
Educational Studies, 26*(3), 289-300.
https://doi.org/10.1080/03323310701491562

Marcus-Quinn, A., Hourigan, T., & McCoy, S. (2019). The digital learning movement: How
should irish schools respond? *The Economic and Social Review, 50*(4), 767-783.

Marttinen, R., Vernikoff, L., Phillips, S., & Fletcher, N. (2017). Physical activity, screen
time, and obesity. *Californian Journal of Health Promotion*, *15*(1), 27-35.

McAleavy, T., Joynes, C., Gibbs, E., & Sims, K. (2020). What steps are being taken to
reach the most disadvantaged students during the period of COVID-19 school
closure.
*Education Development Trust. https://edtechhub.
org/wp-content/uploads/2020/05/disadvantaged-students. pdf (details)*.

McAvinue, L., & Weir, S. (2015). The evaluation of DEIS at post-primary level: An update
on trends over time in achievement and retention levels. *Dublin, Ireland:
Educational Research Centre*.

McCoy, S., & Lyons, S. (2018). Digital technologies and student learning. *Ireland's
yearbook of education*, *2019*, 43-48.

McCoy, S., Banks, J., & Shevlin, M. (2016). Insights into the prevalence of special
educational needs. In J, Williams (Ed.), *Cherishing All the Children Equally?
Ireland 100 Years on from the Rising* (153-174). Oak Tree Press.

McGarr, O., & McDonagh, A. (2021). Exploring the digital competence of pre-service
teachers on entry onto an initial teacher education programme in ireland. *Irish
Educational Studies, 40*(1), 115-128.
https://doi.org/10.1080/03323315.2020.1800501

Messinger-Willman, J., & Marino, M. T. (2010). Universal design for learning and assistive technology: Leadership considerations for promoting inclusive education in today's secondary schools. *Nassp Bulletin*, *94*(1), 5-16.

Miranda-Zapata, E., Lara, L., Navarro, J. J., Saracostti, M., & de-Toro, X. (2018). Modelling the Effect of School Engagement on Attendance to Classes and School Performance. *Revista de Psicodidáctica (English ed.)*, *23*(2), 102-109.

Mirzajani, H., Mahmud, R., Ayub, A. F. M., & Wong, S. L. (2016). Teachers' acceptance of ICT and its integration in the classroom. *Quality Assurance in Education*.

Mohan, G., McCoy, S., Carroll, E., Mihut, G., Lyons, S., & Mac Domhnaill, C. (2020). Learning for all? Second-level education in Ireland during COVID-19. *Economic and Social Research Institute (ESRI) Research Series*.

National Anti-Poverty Strategy. (2002). *National Anti-Poverty Strategy.* The Stationery Office. http://www.socialinclusion.ie/NationalAnti-PovertyStrategy-SharinginProgress1997.pdf.pdf.

National Council for Special Education. (2011). *Inclusive Education Framework: A Guide for Schools on the Inclusion of Pupils with Special Educational Needs*. National Council for Special Education.

Nic Aindriú, S., Ó Duibhir, P., & Travers, J. (2020). The prevalence and types of special educational needs in Irish immersion primary schools in the Republic of Ireland. *European Journal of Special Needs Education*, *35*(5), 603-619.

Odom, S. L., Thompson, J. L., Hedges, S., Boyd, B. A., Dykstra, J. R., Duda, M. A., ... & Bord, A. (2015). Technology-aided interventions and instruction for adolescents with autism spectrum disorder. *Journal of autism and developmental disorders*, *45*(12), 3805-3819.

OECD. (2020). *Teachers' training and use of information and communications technology in the face of the COVID-19 crisis.* (Teaching in Focus, No. 35).OECD Publishing, Paris. https://doi.org/10.1787/696e0661-en.

Ó Ríordáin, A., Keogh, D., Coulter, C., Courtney, P., (2015) *Review of DEIS: Poverty and Social Inclusion in Education.* In D.Nic Craith, P. Downes (Ed.) Proceeding of a Joint Conference: INTO and Educational Disadvantage Centre, St. Patrick's College, Drumcondra (pp. 1-98). INTO, Educational Disadvantage Centre, St Patrick's College, Drumcondra.

Owens, J. A., & Weiss, M. R. (2017). Insufficient sleep in adolescents: causes and consequences. *Minerva pediatrica*, *69*(4), 326-336

O'Brien, W., Belton, S., Fitzpatrick, B., Shannon, S., Brennan, D., Chambers, F., ... & Breslin, G. (2021). Relationship between gender, physical activity, screen time, body mass index and wellbeing in Irish children from social-disadvantage. *Child Care in Practice*, 1-15.

Prieto-Rodriguez, E. (2016). It Just Takes so Much Time!: A Study of Teachers' Use of ICT to Convey Relevance of Mathematical Content. *International Journal for Technology in Mathematics Education*, *23*(1), 13-24.

Radhakrishnan, D., DeBoer, J., & Kimani, S. (2018). Teachers as Guides: The role of teachers in the facilitation of technology-mediated learning in an alternative education setting in western Kenya.

Redecker, C. (2017). European Framework for the Digital Competence of Educators: DigCompEdu (Joint Research Centre, Institute for Prospective Technological Studies, Hrsg.). *Luxembourg: Publications Office of the European Union. Zugriff am*, *23*, 2018.

Scully, D., Lehane, P., & Scully, C. (2021). 'It is no longer scary': digital learning before and during the Covid-19 pandemic in Irish secondary schools. *Technology, Pedagogy and Education*, 1-23.

Shin, J. (2018). Joint association of screen time and physical activity with obesity: Findings from the Korea media panel study. *Osong public health and research perspectives*, *9*(4), 207.

Smit, K., de Brabander, C. J., & Martens, R. L. (2014). Student-centred and teacher-centred learning environment in pre-vocational secondary education: Psychological needs, and motivation. *Scandinavian Journal of Educational Research*, *58*(6), 695-712.

Smyth, E., Dunne, A., Darmody, M., & McCoy, S. (2007). Gearing up for the exam?: The experience of junior certificate students. *Economic and Social Research Institute (ESRI) Research Series*.

Smyth, E., McCoy, S., & Kingston, G. (2015). Learning from the Evaluation of DEIS. *Dublin: Economic and Social Research Institute*.

Smyth, E. (2017). *Off to a Good Start: Primary School Experiences and the Transition to Second-Level*. Economic and Social Research Institute (ESRI).

Starkey, L. (2010). Teachers' pedagogical reasoning and action in the digital age. *Teachers and Teaching, Theory and Practice, 16*(2), 233-244. https://doi.org/10.1080/13540600903478433

Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, *50*(1), 37-56.

Stiglic, N., & Viner, R. M. (2019). Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open, 9*(1), e023191-e023191. https://doi.org/10.1136/bmjopen-2018-023191

The Inspectorate Department of Education and Skills. (2015). *Looking at Action Planning for Improvement in DEIS Post-Primary Schools, Inspectorate Evaluation Studies.* https://www.education.ie/en/Publications/Inspection-Reports-Publications/Evaluation - Reports-Guidelines/Looking-at-Action-Planning-for-Improvement-in-DEIS-Post-Primary-Schools.pdf.

The Inspectorate Department of Education and Skills. (2016). *Looking at our School 2016, A Quality Framework for Post-Primary Schools.*

The Inspectorate Department of Education and Skills. (2020). *Digital learning 2020: Reporting on practice in Early Learning and Care, Primary and Post-Primary Contexts*. Inspectorate Department of Education and Skills.

Thomas, F.B. (2021). The innovative practice of assistive technology empowers persons with disabilities fostering towards an independent learning in inclusive classroom settings. *International Journal of Multidisciplinary Research and Growth Evaluation,* 2(1), 108-115. https://www.allmultidisciplinaryjournal.com/archivesarticle/2021.v2.i1.93.pdf

Thomas, G., Bennie, J. A., De Cocker, K., Ireland, M. J., & Biddle, S. J. (2020). Screen-based behaviors in Australian adolescents: Longitudinal trends from a 4-year follow-up study. *Preventive Medicine*, *141*, 106258.

Thomson, S. (2020, April 20). *What PISA tells us about our preparedness for remote learning.* Australian Council for Educational Research (ACER) ACEReSearch. https://research.acer.edu.au/cgi/viewcontent.cgi?article=1007&context=columnists_su e_thomson

Trinh, L., Wong, B., & Faulkner, G. E. (2015). The independent and interactive associations of screen time and physical activity on mental health, school connectedness and

academic achievement among a population-based sample of youth. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, *24*(1), 17.

Unal, S., & Ozturk, I. H. (2012). Barriers to ITC integration into teachers' classroom practices: Lessons from a case study on social studies teachers in Turkey. *World Applied Sciences Journal*, *18*(7), 939-944.

Virgara, R., Phillips, A., Lewis, L., Richardson, M., & Maher, C. (2021). Development of Australian physical activity and screen time guidelines for outside school hours care: an international Delphi study. *International Journal of Behavioral Nutrition and Physical Activity*, *18*(1), 1-14.

Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van de Gaer, E., & Monseur, C. (2013). The Use of ICT in Education: a survey of schools in Europe. *European journal of education*, *48*(1), 11-27.

Weir, S., & Kavanagh, L. (2018). *The evaluation of DEIS at post-primary level: Closing the achievement and attainment gaps*. Educational Research Centre.

Weir, S., Errity, D., & McAvinue, L. (2015). Factors associated with educational disadvantage in rural and urban areas. *The Irish Journal of Education/Iris Eireannach an Oideachais*, 94-110.