Project: Technology, learning to read and consolidation of the reading habit

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Reading in the Digital Age

A report undertaken for E.ducate Uruguay

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1. Introduction

This report examines the use of digital technologies (DT) in the teaching and learning of reading. The aim is to identify practice and research which indicate the ways that DT can enhance the learning-to-read process, including broader school-wide ecosystems and particular New Zealand school and international contexts. It will consider a range of factors that impact on student and teacher preferences when using DT tools, including those related to the choice and management of these ecosystems and tools. Current effective practice will then be outlined including the use digital pedagogical media, in conjunction with other media such as books, and in conjunction with associated social activity.

Rationale

The evaluation of impact of the "Reading is a journey" project showed that the programme improves reading practices, reading habits and indicates an advancement in reading skills, especially in underachieving students. The data also showed that children prefer to read hardcopy books, despite having access to a broad and diverse range of eBooks and digital resources. The question arises: Is this due to embedded teacher practice and teacher preference and modelling, or through particular differences in the pedagogical media?

In this sense, we seek to identify more precisely the affordances, that is, the opportunities and constraints of technology and its limits and strength on the impact on the development of reading skills, especially in vulnerable socio-economical contexts. This is of importance in developing countries like Uruguay, since DT not only makes access to books and educational material cheaper but easier to distribute in isolated areas. DT have also been shown to facilitate and enhance social interactions and collaborative work.

As well, coupled with the increasing sophistication and impact of digital technologies, the notion of 21st century learning has emerged. This incorporates DT and acknowledges that the world of digital technology is ever changing. The greater and more equitable access to connectivity to the internet, and proliferation of mobile digital technologies, also provide opportunities and constraints that need to be negotiated and optimised (Calder, Larkin & Sinclair, 2018).

The report begins with a brief survey of research and research literature, including the rationale and constructs for using DT in reading. It firstly considers the reading process, what are its key components and how they interact with each other. This is followed by a consideration of DT as pedagogical media, what they offer in terms of the teaching and learning process. The next section examines ways to develop reading through DT, the processes, including the use of games, eBooks and blended delivery. The final section reports on classroom practices that have been used effectively in both New Zealand and international settings; the types of learning experiences that schools and practitioners have employed successfully.

2. Using Digital Technologies in the teaching and learning of reading

2.1 The Reading Process

Reading, one of the key literacy skills, is a process that starts with seeing, continues with acquiring knowledge with attention and perception, and ends with comprehension, understanding, and critical thinking (Kusdemir & Bulut, 2018). Reading skills can be defined as having the proficiency and expertise in recognizing, comprehending and remembering words which are essential for successful reading. The Program for International Student Assessment (PISA) study defined the reading skill as: An individual's understanding, using, reflecting on and engaging with written texts in order to achieve one's goals, develop one's knowledge and potential, and participate in society. This definition acknowledges the diversity and complexity of the processes involved in daily reading activities (OECD, 2016).

However, reading is much more than decoding the letters or texts, it is a process of understanding and comprehension. Recognizing the words; finding the central ideas embodied in the text; analysing the structure of the text; understanding the ideas of the writer; comprehending the relative importance and critical evaluation of the ideas in the text; and remembering processes are important components in the development of reading. Educators' objectives regarding the reading process for children include: using sources of information; including meaning and grapho-phonic information with confidence to make sense of increasingly varied and complex texts; selecting and reading texts for enjoyment and personal fulfilment; and using a range of processing and comprehension strategies with growing confidence. Part of this process of developing the reading skills of the children includes further enhancing skills such as researching, discovering, interpreting and restructuring

knowledge, and ensuring that they evaluate and question what they read from a critical perspective (Ministry of Education, 2007).

Table 1 presents English reading components adapted from various international curriculums, e.g., Department for Education (2013); FCRR (2006); Ministry of Education (2010) for reading development. Column one of Table 1 lists English reading components, with column two presenting the sub-components of each component that are essential for develop reading skills.

Table 1: Components of Reading

Components of Reading (English specific, but also applicable generally)	Sub-components
Phonological awareness	• Phoneme matching and isolating • Phoneme segmenting and blending • Phoneme manipulating
Word coding/decoding	• Letter-sound correspondence • Sight words • Syllable patterns • Morpheme structures
Reading fluency	• Letter-sound correspondence • Words and phrases • Chunked text
Vocabulary	• Word knowledge • Word meaning
Comprehension	• Narrative text structure • Pre-reading strategies • Text analysis: Identifying and organising text, such as: o Locate specific factual information to answer short questions; o Predict what follows in the text using context and prior knowledge; o Use context to infer missing words.

In New Zealand Years 1 to 3 (5-7 year olds) classrooms, read-aloud practices are included in the process, in order to enable fluent reading. In addition, the development of reading skills is facilitated by providing structured readers that can attract the children's interests, although at this level the focus is more on the decoding of text, including the association of sounds with clusters of letters, rather than the comprehension of the texts (Karatay, 2011). The development of reading skill is also related to the individual's personal characteristics and environmental factors. The act of reading is an internal process. In this process, the individual having interest and motivation towards reading is effective in terms of acquiring and maintaining the reading habit. In order for the reading habit to become an enjoyable activity for the individual and to be maintained, the person needs to be motivated (Aydemir & Ozturk, 2013). A good reader should have the reading skill and a desire to read (Cambria & Guthrie, 2010) and possess a reading habit (Schiefele et al., 2012). Motivation in learning to read is known to be related to language skills, reading skill, and reading habits (Kirchhoff, 2013; McGeown et al., 2015). Although a reader's acquisition of the reading skill is enough for her to understand the text, lack of motivation might constrain the process to becoming a good reader. In addition to the individual's internal desire, external stimuli, or having

external motivation increases the reading frequency and the student's willingness to read. Having the opportunity to access reading materials and a supportive environment enables the child to develop a desire to read.

Having a positive attitude towards the acquisition of the reading habit, starting in the early years, and the continuation of the reading habit through the support of regular, and critical, reading enhances reading motivation, which is a way of determining individuals' willingness to read. DT have been shown to enhance motivation to engage in the learning process across a range of curriculum areas, for instance, in elementary school mathematics (Attard, 2018). They have also been shown to motivate reluctant learners through reshaping the learning context and processes, for instance, with teenagers in literacy and numeracy (Calder & Campbell, 2016). In the next section, DT as pedagogical media will be considered.

2.2 Digital Technologies as pedagogical media

In the New Zealand educational context, the expectation is that students will complete their school years as: "Young people who are confident, connected, actively involved and lifelong learners" (Ministry of Education, 2007, p.7). Traditional discrete delivery of knowledge has been transformed to allow for a focus more in line with inquiry learning and a process-oriented approach to learning, including key competencies. These key competencies can be considered as the vital attributes for learning and living in the 21st century and beyond. An e-Learning action plan delivered by the Ministry (Ministry of Education, 2006) ascertained that today's students need to be able to use DT effectively over a range of curriculum areas and to be confident and capable in doing so. In terms of teaching, teachers who routinely use ICT in their classrooms are more likely to integrate it in order to meet their students' needs and simultaneously allow for greater levels of integration and collaboration (OECD, 2015; Wright, 2010). The New Zealand Curriculum, alongside a range of international reports (Campbell, 2001; Johnson, Smith & Stone, 2010; Somekh, 2007) frequently highlights the importance of student interaction and collaboration, which are reflected alongside other pedagogical actions such as co-operation, inquiry, ample opportunities to grasp new learning ,and a learning environment which encourages students and teacher reflection (Wright, 2010).

A more student-centred inquiry approach to learning, incorporating the use of DT is advocated. "Increasingly, mobile devices equip students to take charge of their own learning in a context where learning occurs anywhere, anytime, and with access to a wealth of content and interactive tools. Digital technologies can excite and engage educators, students, their whānau and communities in learning" (21st Century Learning Reference Group, 2014, p.4) as well as diminishing international communication and learning boundaries, providing greater opportunities for distance learning. Research also suggests that activities that incorporate mobile technologies can promote active and collaborative learning which is an identified component of student engagement (Kuh, 2005) and associated with positive learning outcomes (Harper & Quaye, 2009; Kinzie, 2010; Prince, 2004). This belief is in unison with recent research literature which relates student engagement with achievement in literacy learning (Hipkins, Wylie, & Hodgen, 2007).

However, a diverse range of researchers are united in their belief, that educators need to change, adapt and utilise modern technology in order to engage students regardless of their technological skill, by creating intriguing and original opportunities that motivate and engage their students and empower them to learn (Boyd, 2014; Koutropoulous, 2011; Prensky, 2001;

VanSkyle, 2003; Zur & Zur, 2011. As tablets and smart phones continue to evolve in mobile technology, practitioners and researchers believe that education opportunities have so far been keeping pace in attempting to adapt such devices to the teaching and learning process (e.g., Psiropoulous et al., 2016). Simultaneously, they have been advocating for the adaption of teaching practice to best optimize the affordances of the devices, in order to enhance the teaching, and the learning experience of the learners (Benton 2012; Crichton, Pegler & White 2012).

While digital technologies such as iPads and digital notebooks are used for more generic processes such as internet research, preparing reports and presentations, and communication (Suhr, Hernandez, Grimes, & Warschauer, 2010), they also reported that the use of mobile devices in the classroom enhanced Year 7 and 9 students' engagement and impacted positively on the classroom environment. Situated within a study examining the use of the iPad in literacy learning, Hutchison, Beschorner and Schmidt-Crawford (2012) identified some advantages and considerations of using iPads that are more generic and would be applicable to learning through mobile technologies in general. They contend that iPads power on and off very quickly, so that it is easy to integrate them spontaneously without disrupting the learning. In addition, students were able to quickly learn to navigate the iPad, and when they did encounter problems, they worked collaboratively to resolve them, leading to enhanced conversations. These features are applicable to mobile technologies in general, while there are also elements of mobile technologies, and DT in general, that can enhance the teaching and learning of reading in particular. The next section considers these.

2.3 Developing reading through Digital Technologies

While digital technologies are used for more generic literacy processes such as internet research, preparing reports and presentations, and communication (Suhr et al., 2010), iPads can also support literacy programmes through the availability of specific skills apps and digital books. Although the learning experience with eBook reading and writing is different than with printed books, these new literacies nevertheless foster approaches that better suit a range of learners and can enhance individual learning trajectories (Coiro, Knobel, Lankshear, & Leu, 2008). They have the potential to engage struggling readers (Calder & Campbell, 2016; Reinking, 2001). There are opportunities for learners to be more tactile in their interactions with text, utilising the haptic affordance, by manipulating and transforming texts on touchscreens and undertaking activities that more closely match individual needs (Larson, 2010). Others have identified the different skills, strategies and dispositions students need in order to read and navigate digital text (e.g., Hutchison et al., 2012).

Some apps are designed to elicit responses to text, while other elements identified as being conducive to the development of literacy are those that allow students to record and self-analyse their oral reading or record their responses verbally; to type write over text or images; to insert symbols or images; and to organise responses graphically (Hutchison et al., 2012). They also identified features that facilitate collaboration by allowing the simultaneous sharing of responses or screens, and the use of the inbuilt cameras as valuable features with potential to enhance literacy. They concluded that " ... using iPads for literacy instruction not only supported student learning, but students were also highly engaged and able to demonstrate unique and creative ways of responding to text..." (Hutchison et al., 2012, p. 23).

It is apparent that conditional to the nature and quality of the app, and the matching to particular individual learning trajectories, apps can certainly influence students' attitudes to

learning and facilitate learning effectively. On the other hand, the indiscriminate use of apps without teacher research, appropriate technological pedagogical content knowledge and matching to students' learning, is most likely going to be ineffective in supporting teacher learning objectives for the students (Calder & Campbell, 2016). While many educational institutes are investing in a range of newer, more mobile technologies such as tablets, teachers are often expected to integrate the technologies into teaching and learning without the support of professional development, particularly in relation to using the technology to enhance teaching, learning and student engagement (Attard & Curry, 2012).

There has been substantial research around iPads improving reading experience (e.g., Fernández-López et al., 2013; Huber, 2012; Sloan, 2012; Zambarbieri & Carniglia, 2012), and fostering student learning and performance (e.g., Churchill, Fox, & King, 2012; Fernández-López et al., 2013; Isabwe, 2012; Rodríguez-Fórtiz, Rodríguez-Almendros, & Martínez-Segura, 2013). Yet, despite this research (Apple, 2014), the research investigating the direct influence eBooks have on academic achievement is not always conclusive. However, if educators are to adopt such readers, for improved access to resources in isolated rural schools, or due to accessibility as most devices accommodate eBooks, the ways that they might influence and improve reading is a critical aspect to consider. To be an effective approach, digital readers also need to improve reading ability, compared with that of traditional printed text methods. Reading digitally can impact on the way an individual comprehends what is read, as web text contains additional features, thus making it different from reading printed text (Sheppard, 2011; Sutherland-Smith, 2002). While tablets can incorporate the features of an eBook reader, they also allow access to a vast repository of resources on the internet; allowing users to seamlessly switch from one text to another or to delve beyond the text itself (Sheppard, 2011). Check Monique's thesis. The employment of tablet technology to improve reading performance within educational institutions has been well researched in the short time they have entered into mainstream education (e.g., Coiro, 2011; Dundar & Akcayir, 2011; Saine, 2012).

Another area of growth and development for using DT in the teaching and learning of reading is the use of digital games to enhance reading. Research into digital game-based learning recommends essential game design elements for effective educational games such as design layout, choice, adaptability, interactivity, fantasy, flow of the game with appropriate challenge, instructions, elements of self-paced learning, engagement and motivation, navigation, and technical support (Lim et al., 2018; Reinhardt, 2017). Evaluating digital games must consider the games' affordances within the socio-cultural, linguistic, economic, educational and technological context of the target audience (Dede, 2018; Koval-Saifi, 2018; Lim et al., 2018). Aspects such as collaboration and engagement require consideration too.

Such focus around social engagement and interaction through collaboration in reading is vital, as often students who are low achievers in reading can feel socially marginalized and lack a sense of belonging. Subsequently, this can diminish self-esteem creating a declining trend of self-perception related to lower cognitive competence, intrinsic motivation and self-efficiency, providing further disengagement from reading (Anderman & Anderman, 1999). Consequently, tablets and smartphones, as interactive tools, have the potential to accommodate and enhance collaborative learning through stimulating, interactive multi-media and multi-touch features (e.g., Hourcade, Beitler, Cormenzana & Flores, 2009; Leichtensten, Andre & Vogt, 2007). There is a multitude of commercial digital games that foster reading development. However, choosing the appropriate one takes time, while the effectiveness and educational value of such games are often unknown. Several frameworks are available in the literature to design and

evaluate educational games (e.g., Arnab et al., 2015; Carvalho et al., 2015; De Freitas et al., 2010). However, none of these focuses on the core constituents of reading skills such as phonological awareness, word decoding, reading fluency, vocabulary, or comprehension. Table 2 presents a framework for evaluating digital games in terms of the components of reading.

Table 2: Components of Reading linked to criteria for evaluating digital games (Ahmad, 2021).

Educational Components (English Reading Components)	
Phonological awareness	*a. Phoneme matching and isolating*: The game provides opportunities to practice matching and isolating initial, final and medial phonemes in words. *b. Phoneme segmenting and blending:* The game provides opportunities to practice segmenting and blending phonemes in words. *c. Phoneme manipulating:* The game provides opportunities to practice manipulating phonemes in words.
Word coding/decoding	*a. Letter-sound correspondence:* The game provides opportunities to practice matching phonemes and digraphs to letters. *b. Sight words:* The game provides opportunities to practice reading high frequency or sight words. *c. Syllable patterns:* The game provides opportunities to practice blending, segmenting, and identifying syllables in words. *d. Morpheme structures:* The game provides opportunities to practice forming compound words and identifying individual words in compound words, identifying base words with inflections, and blending base words with affixes and inflections.
Reading Fluency	*a. Letter-sound correspondence:* The game provides opportunities to use timed practices to recognise letter-sounds. *b. Words and Phrases:* The game provides opportunities to use timed practices to read words and phrases. *c. Chunked Text:* The game provides opportunities to practice reading chunked text with prosody.
Vocabulary	*a. Word knowledge:* The game provides opportunities to practice identifying contractions, synonyms, antonyms, homophones, and homographs. *b. Word meaning:* The game provides opportunities to practice identifying and producing the meaning of words.
Comprehension	*a. Narrative text structure:* The game provides opportunities to practice identifying story elements such as, characters, setting, sequence of events, problems, solution, plot, and theme. *b. Pre-reading strategies:* The game provides opportunities to predict some words that might occur in a text by looking at picture/title. *c. Text analysis:* The game provides opportunities to practice identifying and organising text, such as: • Locate specific factual information to answer short questions; • Predict what follows in the text using context and prior knowledge;

- Use context to infer missing words.

The utilisation of such a framework would assist teacher teams, teacher professional groups or educators to best determine the particular aspects of reading that are addressed in a game and the extent to which it incorporates and interacts with other components of the reading process. The report will now draw together the overall, key elements of using digital technologies in the context of teaching and learning reading.

2.5 Summary

To examine how DT might influence and enhance the teaching and learning of reading it is critical to understand the overall reading process, but also to deconstruct the components of learning to read and how these contribute to developing a life-long reading habit. The key elements of this are related to text, fluency and comprehension. The relationship and connectedness between these is complex, but if successful will lead to the reader being able to critically evaluate the ideas in the text. It is a personal process with enjoyment and personal fulfilment implicit in the development of the reading habit. Central also is the learner's motivation and engagement with the reading process, accessibility to resource materials, and a supportive environment. DT have been shown to motivate learners and improve accessibility to reading resources.

In general, DT as pedagogical media, have links to student-centred inquiry learning and what some nations call 21st Century skills, such as researching, thinking and collaborating. eLearning can facilitate these and offer continual access to content and interactive tools. In this way they can diminish national boundaries and support distance learning. Internationally, the need for teachers to adapt their practice has been recognised with on-going teacher professional development learning essential in this regard. Given the convergence of these elements, there is strong evidence that DT can enhance skills, engagement and motivation in the learning to read process, especially in the learners' transition to a lifelong habitual reader.

DT support the development in literacy in general, with aspects such as writing and reading reports and fiction, while the use of apps and eBooks has been shown to be effective in developing the reading process. It is a different reading experience but can complement the process of reading through books and other paper media. They can motivate reluctant learners, with touchscreens, recording reading, and the simultaneous linking of different representations of text (visual, oral, and tactile) also beneficial. However, the benefits are conditional on the nature and quality of the apps and resources, the matching to learners' requirements, and the quality of the teachers' on-going professional development learning. Digital games are another medium through which reading skills and processes can be developed, while they have also been shown to enhance motivation to read, particularly with digital text. With a diverse range of digital games available, and the content and context being so important, having a selection criteria is key to determining their usefulness and appropriateness to learning reading for particular are-groups and contexts. Overall, the literature is relative consistent that DT can improve the teaching and learning of reading, but this is contingent on the quality of the apps, the matching of the resources to learners' contexts and needs, and the expertise and inclination of the teachers. The report will now briefly scan and report some current successful practice of using DT to enhance the reading process.

3. Digital technologies in reading: Learning experiences.

The next section reports on current practice when using digital technologies in the reading process, and the types of learning experiences facilitated. It outlines a range of approaches that used to enhance the reading process through the use of DT. They are a set of case studies, mainly in New Zealand that reflect a group of schools, classes, and age groups within different contexts and overall learning philosophies. Following the reporting of the cases, some general aspects will be identified and key elements that resonate through the cases. A possible approach will be outlined to complete the report.

3.1 A medium-sized school in a New Zealand city.

This school uses a varied approach depending on the age level. The younger students begin with a programme using sequenced readers. There is a mixture of whole-class shared reading aloud, group work with sequentially ordered readers in ability groups, and individual readers that students take home for reading with caregivers. There is also some limited use of digital resources and apps to develop specific reading skills or processes. As the students progress through the year levels there is greater emphasis on personal selection of books or digital resources, and time and space allowed for individual reading, often silent reading.

As well, there is a growing emphasis and facilitation of reading online to research student-centred investigations and inquiry. These student-inquiries are often personal (or group decided) questions that are cross curricular and negotiated with teacher input under a broader "umbrella" focus for the class or year level. There is also a greater emphasis on the use of digital resources including eBooks. The following are a range of resources that the school uses successfully in Years 3-6 (Ages 7-10). These have been organised into two different sections: Reading through digital technology and digital technology that improves reading.

1) Reading through DT:

- **Read Theory**: https://readtheory.org/. This is great for reading comprehension. It's free, can be accessed from home and school and students can log in with their google accounts. It does a placement test, and then is adaptive in the texts it assigns depending on their responses to each text quiz. Teachers can have access to all the analytics.
- **Get Epic:** https://www.getepic.com/. Basically a massive online library with novels, picture books, non-fiction texts and audiobooks. Teachers set up a class and can circulate books to everyone individually too. They do this for topic, work for instance, to push everyone a book that relates to a certain context or idea that they will be working on later. The children love it for silent reading. Many of the books have a quiz attached, so they can test their comprehension themselves too.

2) DT that enhance reading practice while teaching concepts from the DT in the Technology strand of the New Zealand Curriculum (NZC):

- The CodeClub NZ https://codeclub.nz/page/code-club-projects resources are really effective and engaging. You can run them through *Scratch*. The children need to read and follow the instructions, and they can create heaps of cool coding projects.

There is a big focus on computation thinking and designing and developing digital outcomes (DDDO).

- TinkerCad: 3D design through *Tinkercad*. The tutorials here have great reading instructions to follow and the children find this really engaging. The senior school uses *Tinkercad* a lot in the classroom, especially the one class lucky enough to have a 3-D printer in the classroom.

The school and many other New Zealand ones use *seesaw* as a medium for sharing files, projects, and tasks, including with parents. One of the schools talked to is presently moving away from reports and parent three-way conferences (or parent report evenings) to just having an ongoing sharing of the students' work, assessment feedback, and creations online available to the parents throughout the year via *seesaw*.

3.2 A large private Christian school in a provincial city Bethlehem College (Monique)

Several Year 5-9 classes (ages 9-13) at this school use a range of apps to supplement the reading programme which is mainly delivered through hardcopy resources. These are predominantly apps that develop particular reading skills, such as word recognition and comprehension. In a recent research study at the school the findings revealed that there was no significant difference in assessment results between the groups of participants using the apps and those not using them in terms of reading comprehension. Motivation and engagement increased though. It was acknowledged that there were a large number of possible variables related to DT impacting upon the students learning throughout the study, such as iPad access (the iPads used had to be shared with other curriculum areas) and lack of internet connection. Results from the study indicated that the multimedia and visual features of the iPad also assist in making reading activities more relevant and meaningful for the students who along with social interaction, require frequent stimuli to keep them engaged throughout the learning process. The students also used a mixture of iPads and laptops to research topics that they were studying in other curriculum areas. This involved reading and was considered part of an integrated reading programme.

3.3 The utilisation of DT games to foster reading: an international perspective (Based on an interview with Farzana Ahmad, a lecturer at WinTec and PhD student studying the use of digital games to develop reading).

For the majority of languages, reading is not a single, discrete skill but a combination of subskills that interact with each in unison. These skills are typically considered as phonological awareness, word coding/decoding, reading fluency, vocabulary, and reading comprehension. Reading fluency occurs when each of these particular subskills is understood and consolidated individually, hence enabling the potential reader to combine these skills in the processes of reading print or digital text, comprehending information, answering questions related to text and engage in discussion with others about written stories or information. Phonic-based languages have a predictable relationship between phonemes and graphemes, the sounds those letters represent in written language. Therefore, games for reading development must involve readers in practising phonological awareness and applying skills in a meaningful context. This may vary across different languages. Developing phonological awareness leads to developing word recognition, reading fluency, improving vocabulary and reading comprehension. It is widely recognised that children acquire reading

skills best when they are given the opportunities to practice subskills of reading by completing tasks in engaging but challenging ways. Importantly, challenge needs to be included without the reading being too difficult for beginner readers. Therefore, effective digital games should aim to develop the subskills beginning with simpler tasks and content to incrementally incorporate more challenging and complex reading tasks in gradual manner. A digital game may develop one subskill before progressing onto developing another. However, the key to success with using digital games to develop reading fluency and comprehension is to provide appropriate practice time to master the skills and apply the newly acquired skills within a range of books, digital resources, and other reading contexts.

Ahmad recommended the following digital game that she has used successfully for the teaching of reading.

Teach Your Monster to Read is a series of learning games designed for early reading development available to download from https://www.teachyourmonstertoread.com/. The desktop version of this game is free to download, whereas, mobile version is available at a low cost less than NZ$10. The game was a collaborative effort of graphic designers and developers of Popleaf Software Development Company and educational consultants from the United Kingdom specialising in early literacy development and digital games.
The game starts by the students creating customised avatar – a monster, which was also linked to an interactive reward system offering a choice of accessories, outfits or treats to select for the monster every time the children complete a certain level in the game. The game has a storyline seamlessly woven throughout the game, changing slightly at each level. The game comprises of a series of mini-games divided into three categories based on reading complexity: First steps for children, Fun with words, and Champion readers. Each of these is described below:

First Steps for Children:
This series of digital games is aimed at children who are beginning to learn letters and sounds in the English language. One of the key purposes of this category is to develop children's speed and accuracy with letter recognition. The children work through each grapheme by practising letters and sounds across the series of games included in this first category. The games in this category can be progressed through over many days as the game world is set in eight islands, each presenting opportunities to practice graphemes with an intriguing storyline and settings. The recommendation is for the game to be played for 30 minutes a day for five days a week. Learning goals in this category of games include practising graphemes, blending sounds, decoding, and segmenting CVC (Consonant, Vowel, Consonant) words into their constituent sounds. The game is also complex adaptive which means that it responds to individual children's needs depending on the choices that they make. Graphemes which children are struggling with most often will appear more frequently in the mini-games, thus providing ample practice opportunities to develop letter recognition skills.

Fun with Words:
This category is a higher, more advanced game level designed for children who have completed *Teach Your Monster to Read: First Steps for Children*. The series of games included in this category provide a range of opportunities to practice new graphemes and phonemes such as ch, sh, th, ng, ai, ee. igh. oa, oo, ar, or, ur, ow, oi, ear, air, ure, er. It also introduces more blending and segmenting practice with consonants and vowel combinations, such as CCVC (Consonant, Consonant, Vowel, Consonant) words and some polysyllabic words. As well, the reading and comprehension of simple sentences is part of the skill

development in this category of games. The playtime of each of the games in this category spans over two weeks if they are played for 30 minutes for five days a week.

Champion Readers

The third category of games is targeted for slightly advanced readers who have grasped good knowledge of graphemes-phonemes covered in the previous two game categories and who are able to read short sentences. The series of games included in this category provides children opportunities to practise alternative ways of pronouncing graphemes, such as i (pronounced as /*igh*), ch (pronounced as /*k*), y (pronounced as /*ee*), etc. It also provides practising sight words, reading and comprehension of sentences, rhymes, and short stories. Playtime for each of the games in this category is typically two weeks if the games are played for 30 minutes across five days a week. Figure 1 presents examples of game activities in *Teach Your Monster to Read* game.

Figure 1: ***Example of game activities from Teach Your Monster to Read game***

The game provides opportunities for becoming active participants in learning to read, e.g. learners are actively involved in the process of reading.

3.4 International:

This section discusses an app used in international settings including Turkey. This arose during discussions and interaction with several key informants doing PhD study in literacy or languages.

In the ***KOP-KITApp*** application, approximately 150 books on science fiction, daily life, adventure, astronomy, nature, entertainment, comedy, social issues, values, sports, music, visual arts, etc. are categorized according to students' interests. The levels and types of Turkish books to be included for use in the application were determined through a process undertaken that included the analysis of the reading-age level and contexts of the stories in the books. The 150 books to be used in the application were determined by two experts and classified as advanced, intermediate and low level. These same two experts also determined the types of 150 books to be included.

The expert team then developed sets of questions to be used for comprehension. Easy, medium, and difficult questions were prepared for each of these books based on the first half and second half of the book separately. Therefore, 48 questions, including at least six of them being easy, twelve of them being medium, six of them difficult, were prepared for each book.

The *KOP-KITApp* application recommends books according to students' areas of interest and achievement levels. Every student reads a short interesting section from the recommended book and decides whether he will read the rest of the book or not. In the next step, the student borrows the recommended book from the school library. When the student starts reading the book, a follow-up procedure is also initiated from the smart app. First, the student answers one easy, two medium, and one difficult level reading comprehension questions on the application. In the second step, the student answers similarly designed comprehension questions after reading the second half of the book. During the *KOP-KITApp* implementation, the students in the experimental group selected and read books according to their areas of interest for four months. The students in the control group chose and read books without using the application. At the end of the implementation process, both groups were implemented a Reading Motivation Scale, and the results of the post-test were compared. When reading motivation of secondary school students is considered, the motivation of students who used *KOP- KITApp* was found significantly higher compared to the students who read without using the application. This finding can be interpreted as the *KOP-KITApp* application significantly increases the reading motivation of secondary school students.

3.5 A large primary school in a provincial city Te Akau ki Papamoa (Ems, Julie?)

This school has a relatively long history (10 years) of integrating digital technologies into their learning programmes. For the last eight years it has had a school-supported one-to-one iPad policy, with all children having an iPad and all teachers using them, integrated within and across curriculum content. They have the philosophy that eLearning is an effective way to increase engagement, attendance, focus, excitement and relevance of learning to students. The staff and students do not learn about the tool itself, but learn about using the tool to access the world around them. With eLearning, DT simply becomes a gateway to the curriculum. They also advocate that the use of DT throughout their programmes, as they contend that digital classrooms are proven to enhance researching, problem solving, and self-directed learning skills, which are an important aspect of the school's philosophy of "leading me to lead my learning". This includes student-centred inquiries which require online reading as part of the research process, the creation and reading of presentations as part of screen

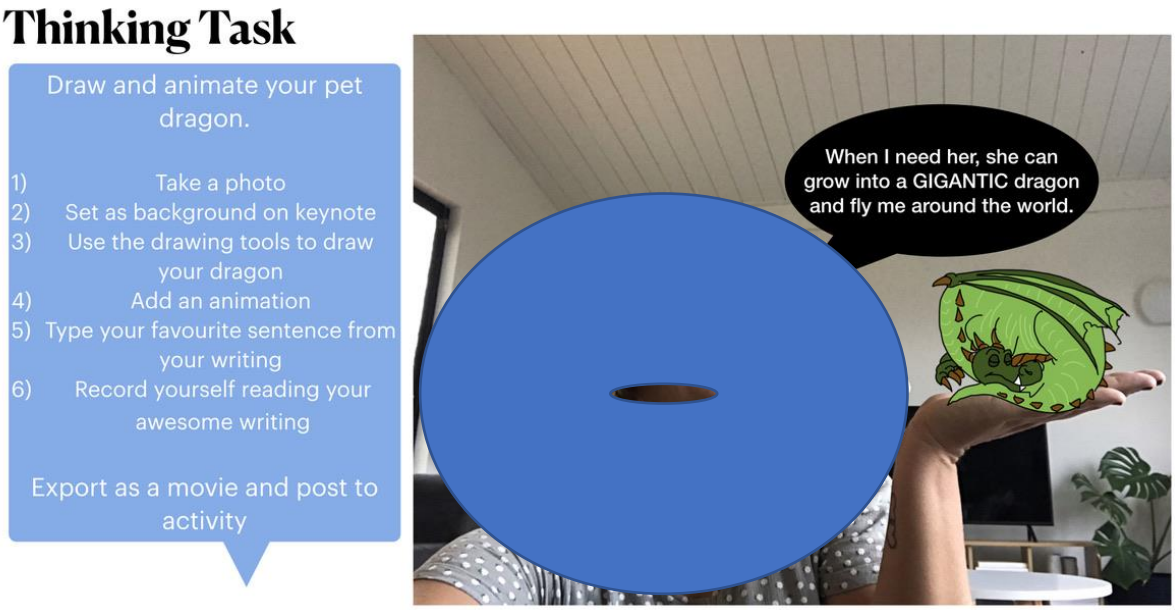
casting, and the using a range of apps that foster student creativity rather than being purely for practicing specific reading skills.

The teacher interviewed was teaching a Year 3 and 4 (ages 7-9) class, but had experience at teaching with DT at earlier year levels. She was a senior teacher at the school.

The school started the children's reading primarily with hardcopy readers. There is a mixture of whole class shared reading aloud, group work with sequentially ordered readers in ability groups, and individual readers that students take home for reading with caregivers. There is also some limited use of digital resources and apps to develop specific readings skills or processes. The older students primarily use digital and online reading resources, with the school not having a physical library. They don't have a focus on eBooks, but mainly utilise *Sunshine* classics and *Epic* digital reading. They borrow picture books from the National Library Service.

They have a policy of integrating DT into all aspects of their work for both researching and presenting, and successfully use the students as leaders of learning in DT. Children both individually, and in groups, use screen-casting and other video tools to create stories and explanations of their work. Typically these have an element of reading of instructions and planning sheets involved. The key aspect for the senior part of this school is having the reading through DT incorporated seamlessly within their child-centred integrated curriculum approach. For this they typically do "Thinking Tasks" where they identify a problem, research possibilities online and formulate a solution. It might be an inquiry about what's happening in the school, community, or class. It could also be related to a story or a local legend.

Below are some examples of the Thinking Tasks:



I love having my lovely teachers because they are so kind

I love singing in class my favourite this term is counting stars

I love playing with my friends because they are so cool

I love doing nga toi with my friends and teachers

Same and different

Copy the next slide to a new Keynote set as a background and write 6 ideas about learning at home compared to learning at school. Don't forget to draw pictures!
Save as an image and send to seesaw.

Learning at home	Learning at school
I can have a snack whenever I like. I miss seeing my friends Whaea Tiana, Whaea Alex and Whaea Sophie. I miss having lunch in the staff room with Whaea Doro, Whaea Casey, Whaea Vanessa and Whaea Ange.	I have to get up early to get ready for school and have my breakfast. We do cool PE with Matua Andy.

The school also uses *seesaw* as a medium for sharing files, projects, and tasks, including with parents. Several of the teachers use *Puppet edu* as part of their reading programme. The children will screenshot or photograph the cover and pages of a book or digital reading text and then record themselves reading the text. They use this to develop and also assess the students reading fluency and comprehension, and for sharing with other students and parents.

There is an emphasis on teacher judgement regarding reading and literacy levels. This is ongoing and the teachers' planning for the class and individuals is linked to levels and learning outcomes and reflections, including their individual initial assessment. The students have instructional reading three times a week. This is in smaller ability-based groups, and incorporates individual feedback. Included in these group sessions are student prediction, skimming and scanning, and developing vocab both within and beyond the text being used.

3.6 Other digital games recommended by NZ teachers as effective for developing different reading skills were:

GraphoGame

https://www.graphogame.com/index.html

ABCmouse: This is an interactive app that includes a huge range of activities, mainly focussed on teaching reading skills for 2-8 year olds, but it does have a section for 8-13 year olds.

Starfall: An app adaption of a long-running, successful website for teaching reading. This is produced by a non-profit group. By the time the students get to the advanced levels they have not only developed their reading but also have engaged with legends, myths, non-fiction and other genres of literature.

Homer: Homer is for 2-8 year olds, and uses a game-based interface. It is student-centred, allowing the students to decide what they want to work on.

Hooked on Phonics: This app uses an integrated system for teaching children to read, making it an ideal option for home-schooling or for use in isolated schools. It is a digital adaption of a long-running programme that used books, flashcards and activity sheets but the digital version includes extra interactive options.

Hoopla: This app allows the user to download audiobooks from the library and listen on demand. This can enhance word fluency and comprehension.

Reading Raven: This app is a phonic-based approach for 3 – 7 year olds, that begins with interactive games, then allows the students to choose different "adventures".

Some apps that were investigated are designed for the teaching of reading in Spanish:

GraphoGame Spanish

https://play.google.com/store/apps/details?id=com.graphogame.gg_spanish&hl=en_US&gl=US

Leo Paso a Paso: An app for beginning readers which focuses on word recognition, using images effectively.

Fun Spanish by Studycat: An app for learning Spanish through play, that is aimed at 3-8 year olds.

Spanish Playground: Has 50 online Spanish stories for children, and reading activities at various levels.

4. Conclusions

Section 3 investigated five case studies of what was considered as good practice when using DT in the teaching of reading. Three of these were NZ schools and the other two based on work in schools set in international contexts. As well, through the case studies various apps were brought to my attention as being valuable for developing reading. This was through enhancing particular skills and then integrating them for fluency and comprehension, or as resources for online reading. These are noted in section 3.6 above.

There appeared to be consensus that in the initial stages of learning to read with young children, the process of reading is best facilitated by a more traditional approach, using a combination of whole class shared reading aloud, group work with sequentially ordered readers in ability groups and individual readers that students take home for reading with caregivers. There is also some limited use of digital resources and apps to develop specific readings skills or processes. Apps such as *seesaw* were used to share students' reading progress and experience, including with parents. This sharing of reading materials and progress continues throughout their schooling, and was situated amongst the broad range of other curriculum areas.

As the students are progressing through the year levels into the senior primary (elementary) grades (7-11 year olds), there is greater emphasis on personal selection of books or digital resources for reading, and more time and space allowed for individual reading. There is also a greater emphasis on the use of digital resources including digital readers, online reading resources and eBooks (depending on individual school or settings). There is also targeted use of online reading programmes and apps that facilitate reading skills development, leading to activities that enhance fluency and comprehension. Many of these are based in game contexts and involve elements of student choice. They usually include diagnostic and reporting facilities that can be accessed by teachers, students and parents as required.

As well, there is a growing emphasis and facilitation of reading online to research student-centred investigations and inquiry. These student-inquiries are often personal (or group decided) questions that are cross curricular and negotiated with teacher input under a broader "umbrella" focus for the class or year level. One NZ school used "Thinking Tasks" where the students identify a problem, research possibilities online and formulate a solution. The range of topics for these inquiries and the general ones indicated above was eclectic. They might be

about what's happening in the school, an issue or event in the community, or a class context. They might also involve a story or a local legend.

Several of the cases, including one of the international ones, used apps that linked to online reading resources, but were focused primarily on students' motivation to read. These give analysis with feedback and ongoing suggestions for practice and materials. Central to all of these approaches and progressions is quality assessment and feedback, with teachers' pedagogical content knowledge to decide the next step or monitor any digital determined step essential. Coupled with this is the availability of appropriate resources, particularly digital ones that the teacher and students (and parents at times too) can access easily without technical or equity issues being problematic.

The next section synthesizes these conclusions with the research literature in section 2, to make some recommendations for the use of DT in the teaching of reading.

Recommendations

The following recommendations are suggested to help ensure best practice and beneficial conditions are included in the approach to learning to read with DT resources.

- Base the initial reading programme with the early readers on a more traditional approach, using a combination of whole class shared reading aloud, group work with sequentially ordered readers in ability groups and individual readers that students take home for reading with caregivers.
- Ensure that these sequential readers, and systems related to their use and the learning that goes with them, are in place and operating effectively.
- Maintain an effective and efficient ongoing online diagnostic and reporting system. This would be used for teacher decision making, and communicating with, and engaging caregivers in the learning to read process.
- Instigate a reporting programme through an app such as *seesaw*.
- Make access to wifi and a range of basic devices available. The provision of one-to-one tablets or any enhanced provision would need to be driven locally by the school leadership or community.
- Make available a series of apps that facilitate reading skill development, fluency and comprehension and easily accessed. This might best be managed centrally to optimise the evaluation of the apps and any costs involved. There would need to be some form of professional learning for teachers related to using this digital repository appropriately and effectively.
- Explore instigating a more student-centred learning culture, with students having voice in the selection of areas to investigate, the resources to be accessed and read, and the presentation tools and media to be utilised. Again, this would need to be facilitated centrally but should have an element of individual school input that could make it manifest in a practical sense differently in each school.
- Have a variety of online readers, eBooks or reading resources available and accessible, for older students in particular.
- Have app-based or centrally supported systems for motivating readers so that reading is supported and encouraged to be considered as a lifelong habit. In the schools this might be focussed around the expertise and enthusiasm of a particular teacher, but having a

central system in place as an option will support others whose expertise might lie on other fields.

- It is suggested that this be managed as groups or clusters that are geographically located and with leadership and a time allowance allocated for a teacher with expertise and enthusiasm. This might be trialled with one or two clusters initially to analyse how it could work optimally.
- Build the eco-system and Community of Practice through a combination of more formal, centrally organised resources and systems, and informal social media platforms.

References

21st Century Learning Reference Group. (2014). Forward. B. O'Riley. Future- focused learning in connected communities (p.2). Retrieved from Education in New Zealand-Ministry of Education website: http://www.education.govt.nz/assets/Documents/Ministry/Initiatives/FutureFocusedLearning30May2014.pdf

Ahmad, F. (2021). Personal communication.

Anderman, L. H., & Anderman, E. M. (1999). Social Predictors of Changes in Students' Achievement Goal Orientations. Contemporary Educational Psychology, 24(1), 21–37. http://doi.org/10.1006/ceps.1998.0978

Apple. (2014). iPad in education results. Retrieved from Apple Education website: https://www.apple.com/education/docs/iPad_in_Education_Results.pdf

Arnab, S., Lim, T., Carvalho, M. B., Bellotti, F., Freitas, S., Louchart, S., Suttie, N., Berta, R., & De Gloria, A. (2015). Mapping learning and game mechanics for serious games analysis. *British Journal of Educational Technology, 46*(2), 391-411. https://doi.org/doi:10.1111/bjet.12113

Attard, C. (2018). Mobile technologies in the primary mathematics classroom: Engaging or not? In N.Calder, K.Larkin & N. Sinclair (Eds.). *Using mobile technologies in the teaching and learning of mathematics.*The Netherlands: Springer. DOI: 10.1007/978-3-319-90179-4.Becker, K. (2017). *Choosing and Using Digital Games in the Classroom: A Practical Guide*. Springer.

Attard, C., & Curry, (2012). Exploring the use of iPads to engage young students with Mathematics. In J. Dindyal, L. P. Cheng & S. F. Ng (Eds.), Mathematics education: Expanding horizons Proceedings of the 35th annual conference of the Mathematics Education Research Group of Australasia (pp. 75–82).). Singapore: MERGA.

Benson, J., & Clark, F. (1982). A guide for instrument development and validation. *American Journal of Occupational Therapy, 36*(12), 789-800.

Benton, B. K. (2012). The iPad as an instructional tool: An examination of teacher implementation experiences (Doctoral thesis, University of Arkansas, Fayvetteville, United States). Retrieved from http://search.proquest.com/docview/1029869338

Boyd, D. (2014). It's Complicated: the social lives of networked teens. London: Yale University Press.

Calder, N. S. & Campbell, A. (2016). Using mathematical apps with reluctant learners. *Digital Experiences in Mathematics Education.* DOI 10.1007/s40751-016-0011-y.

Calder, N.S., Larkin, K., & Sinclair, N. (2018). Mobile technologies: How might using mobile technologies reshape the learning and teaching of mathematics? In N.Calder, K. Larkin & N.Sinclair (Eds.). *Using mobile technologies in the teaching and learning of mathematics.* Springer. https://doi.org/10.1007/978-3-319-90179-4

Calder, N.S., & Murphy, C. (2018). How might apps reshape the learning and teaching of mathematics? In N.Calder, K. Larkin & N.Sinclair (Eds.). *Using mobile technologies in the teaching and learning of mathematics.* Springer. https://doi.org/10.1007/978-3-319-90179-4

Cambria, J., & Guthrie, J.T. (2010). Motivating and engaging students in reading. New England Reading Association Journal, 46(1), 16.

Campbell, N. (2001). E-teaching, e-learning and e-education. A paper to inform the development of the ICT Strategy in New Zealand for the Ministry of Education Retrieved from: http://cms.steo.govt.nz/NR/rdonlyres/C11315DE-804A-4831-AB75-3D4E77393DD8/0/eteaching.htm

Carvalho, M. B., Bellotti, F., Berta, R., De Gloria, A., Sedano, C. I., Hauge, J. B., Hu, J., & Rauterberg, M. (2015, 2015/09/01/). An activity theory-based model for serious games analysis and conceptual design. *Computers & Education, 87*, 166-181. https://doi.org/https://doi.org/10.1016/j.compedu.2015.03.023

Churchill, D., Fox, B., & King, M. (2012). Study of affordances of iPads and teachers' private theories. International Journal of Information and Education Technology, 2(3), 251-254.

Coiro, J. (2011). Predicting reading comprehension on the internet: Contributions of offline reading skills, online reading skills, and prior knowledge. Journal of Literacy Research 43(4), 354-392. http://doi.org/10.1177/1086296X11421979

Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (2008). Handbook of Research on New Literacies. New York, NY: Routledge.

Crichton, S., Pegler, K., & White, D. (2012). Personal devices in public settings: lessons learned from an iPod Touch/iPad project. Electronic Journal of E- Learning, 10(1), 23–31.

De Freitas, S., Rebolledo-Mendez, G., Liarokapis, F., Magoulas, G., & Poulovassilis, A. (2010). Learning as immersive experiences: Using the four-dimensional framework for designing and evaluating immersive learning experiences in a virtual world. *British Journal of Educational Technology, 41*(1), 69-85. https://doi.org/doi:10.1111/j.1467-8535.2009.01024.x

Dede, C. (2018). The potential of digital game-based learning for improving erducation in Global South. In C. P. Lim (Ed.), *Digital game-based learning for global south*. Foundation for Information Technology Education and Development.

Department for Education. (2013). *English programmes of study: Key stage 1 and 2 - National curriculum in England*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335186/PRIMARY_national_curriculum_-_English_220714.pdf

Dundar, H., & Akcayir, M. (2012). Tablet vs. Paper: The effect on learners' reading performance. International Electronic Journal of Elementray Education 4(3), 441-450.

FCRR. (2006). *Second and third grade student center activities: Teacher resource guide*. https://www.fcrr.org/curriculum/pdf/GK-1/TRG_Final_Part1.pdf

Fernández-López, Á., Rodriguez- Fórtiz, M. J., Rodriguez- Almendros, M. L., & Martínez- Segura, M. J. (2013). Mobile learning technology based on iOS devices to support students with special education needs. Computers & Education, 61(0), 77-90. http://dx.doi.org/10.1016/j.compedu.2012.09.014

Harper, S. R., & Quaye, S. J. (2009). Beyond sameness, with engagement and outcomes for all. In S. R. Harper & S. J. Quaye (Eds.), Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations (pp. 1-12). New York, NY: Routledge.

Hipkins, R., Wylie, C., & Hodgen, E. (2007). Can standards-based qualifications improve low-performing students' engagement in learning, and their achievement? Paper presented at the American Educational Research Association (AERA) conference, Chicago.

Hourcade, J. P., Beitler, D., Cormenzana, F., & Flores, P. (2008). Early Olpc Experiences in a Rural Uruguayan School. In CHI '08 Extended Abstracts on Human Factors in Computing Systems (pp. 2503–2512). New York, NY: ACM. http://doi.org/10.1145/1358628.1358707

Huber, S. (2012). iPads in the classroom- A development of a taxonomy for the use of tablets in schools. In M. Ebner & S. Schön (Eds.), iPads in the classroom (pp. 1-77). Norderstedt, Germany: Books on Demand GmbH.

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher*, 66(1), 15–23.

Isabwe, G. M. N. (2012). Investigating the usability of iPad mobile tablet in formative assessment of a mathematics course. Paper presented at the International Conference on Information

Society. New York. Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6285043
Johnson, L., A., Smith, R., & Stone, S. (2010). The 2010 Horizon Report. Austin, Texas: The New Media Consortium. Retrieved from http://files.eric.ed.gov/fulltext/ED510220.pdf
Kinzie, J. (2010). Student Engagement and Learning Experiences that Matter. In J. Christensen Hughes & J. Mighty (Eds.), Taking Stock: Research on Teaching and Learning in Higher Education (pp. 139-154). Montreal: MacGill-Queen's University Press.
Kirchhoff, C. (2013). L2 extensive reading and flow: Clarifying the relationship. Reading in a Foreign Language, 25(2), 192-212.
Koutropoulos, A. (2011). Digital natives: ten years after. Journal of Online Learning and Teaching, 7(4), 525-538.
Kusdemir, Y., & Bulut, P. (2018). The relationship between elementary school students' reading comprehension and reading motivation. Journal of Education and Training Studies, 6(12), 97-110.
Kuh, G. D. (2005). Student engagement in the first year of college. In M. L. Upcraft, J. N. Gardner & B. O. Barfoot (Eds.), Challenging and supporting the first-year student (pp. 86-107). San Francisco, CA: Jossey-Bass.
Kurnaz, A., Arslantas, S., & Pursun, T. (2020). Investigation of the effectiveness of personalized book advice smart application on secondary school students' reading motivation. International Journal of Educational Methodology, 6(3), 587- 602. https://doi.org/10.12973/ijem.6.3.587
Lim, K. Y. T., Comings, J., Lee, R., Yuen, M. D., Hilmy, A., Chua, D., & Song, B. H. (2018). *Guide to Developing Digital Games for Early Garde Literacy for Developing Countries*. Foundation for Information Technology Education and Development, Inc. and World Vision, Inc.
McGeown, S.P., Duncan, L.G., Griffiths, Y.M., & Stothard, S.E. (2015). Exploring the relationship between adolescent's reading skills, reading motivation and reading habits. Reading and Writing, 28(4), 545-569.
Ministry of Education. (2006). Enabling the 21st Century Learner- e-Learning Action Plan for Schools 2006-2010. Learning Media Ltd. Retrieved from the Ministry of Education website: http://www.minedu.govt.nz/educationSectors/Schools/Initiatives/ICTInSchools/ICTInitiativesAndProgrammes/EnablingThe21stCenturyLearner.asp
Ministry of Education (2007). *The New Zealand Curriculum.* Wellington, NZ: Learning Media Ltd.
Ministry of Education. (2010). *The literacy learning progressions*. Learning Media.
OECD. (2015). Students, Computers and Learning: Making the Connection (OECD report). Paris, France: OECD. Retrieved from OECD website: http://dx.doi.org/10.1787/9789264239555-en
OECD (2016), PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic and Financial Literacy, PISA, OECD Publishing, Paris, DOI: http://dx.doi.org/10.1787/9789264255425-en
Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. On the Horizon, 9(5), 1–6. http://doi.org/10.1108/10748120110424816
Prince, M. (2004). Does active learning work? A review of the research. Journal of Engineering Education, 93(3), 223-231.
Psiropoulos, D., Barr, S., Eriksson, C., Fletcher, S., Hargis, J., & Cavanaugh, C. (2016). Professional development for iPad integration in general education: Staying ahead of the curve. Education and Information Technologies, 21(1), 209–228. http://doi.org/10.1007/s10639-014-9316-x
Reinhardt, J. (2017). Digital gaming in L2 teaching and learning. In C. A. Chepelle & S. Sauro (Eds.), *The handbook of technology and second language teaching and learning*. Wiley-Blackwell.
Saine, P. (2012). iPods, iPads, and the SMARTBoard: Transforming literacy instruction and student learning. New England Reading Association Journal,47(2), 74-79
Schiefele, U., Schaffner, E., Moller, J., & Wigfield, A. (2012). Dimensions of reading motivation and their relation to reading behavior and competence. Reading Research Quarterly, 47(4), 427-463.

Sheppard, D. (2011). Reading with iPads–the difference makes a difference. Education Today, 3 (2011), 12-17.
Sloan, R. H. (2012). Using an e-Textbook and iPad- Results of a pilot program. Journal of Educational Technology Systems, 41(1), 87-104. http://doi.org/10.2190/ET.41.1.g
Somekh, B. (2007). Pedagogy and learning with ICT: Researching the art of innovation. New York, NY: Routledge.
Suhr, K.A., Hernandez, D.A., Grimes, D., & Warschauer, M. (2010). Laptops and Fourth-Grade Literacy: Assisting the Jump over the Fourth-Grade Slump. *Journal of Technology, Learning, and Assessment*, 9
(5). Retrieved from http://www.jtla.org.
Sutherland-Smith, W. (2002). Weaving the Literacy Web: Changes in Reading from Page to Screen. The Reading Teacher, 55(7), 662–669.
VanSkyle, T. (2003). Digital natives, digital immigrants: Some thoughts from the generation gap. The technology source, 7(3).
Wright, N. (2010).e-Learning and implications for New Zealand schools: a literature review (Research Report N. 1). Retrieved from the Education Counts website: https://www.educationcounts.govt.nz/__data/assets/pdf_file/0006/7766 7/948_ELearnLitReview.pdf
Zambarbieri, D., & Carniglia, E. (2012). Eye movement analysis of reading from computer displays, eReaders and printed books. Opthalmic and Physiological Optics, 32(5), 390-396. http://doi.org/10.1111/j.1475- 1313.2012.00930.x
Zur, O., & Zur, A. (2011). On digital immigrants and digital natives: How the digital divide affects families, educational institutions, and the workplace. Retrieved from http://www.zurinstitute.com/digital_divide.html