Digital Literacy in Primary Schools (DLIPS)

Report

Digital Literacy: New Approaches to Participation and Inquiry Learning to Foster Literacy Skills among Primary School Children

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Acknowledgements

Often when people think about research and theory there is an expectation that the outcome will consist of abstract concepts and grand findings with little meaningful application to professional education practice. We decided from the outset that this research would be meaningful and practice based.

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Executive Summary

Digital literacy is an important and often misunderstood concept; it has implications for all aspects of primary schooling in Ireland. The purpose of this research is to establish a useful definition and conceptual framework through which the nature of digital literacy can be examined in terms of classroom practice and thereby related to the underpinning policy and support structures.

Our theoretical review points to two contrasting conceptual approaches to literacy and specifically, digital literacy. The traditional view is to regard digital literacy as a set of specific technical skills such as the ability to use software and to operate devices - this is often referred to as a skills model of literacy. In contrast, more recent and increasingly accepted theories conceive of digital literacy in terms of context and social practice - this is a situated approach to literacy.

The difference between the two theoretical orientations is important and has had significant implications for formulating our approach to this research and conceptual framework. Digital literacy, if defined solely in terms of skills, will be associated with individuals and will relate to capabilities and scores against pre-defined, generic competencies. On the other hand, a conceptual framework that adopts a situated approach involves an expanded view of literacy and emphasises the social contexts in which digital media are used.

A situated model of literacy

One of the early decisions of the research team was to adopt the situated approach and therefore to locate the site of investigation within the primary school classroom. Put simply, in our view the best way to investigate digital literacy was to describe the practices and activities that take place in the classroom.

The starting point of the framework for digital literacy was to reference the practices and activities that take place in the classroom. Obviously, the goal of classroom activity is to bring about learning and as such, we grounded our digital literacy framework in a conception of learning centered on the Inquiry Cycle.

An Inquiry Cycle model of learning

An overview of the Inquiry Cycle is provided in the main report. The report also demonstrates how the Inquiry Cycle is appropriate for primary school contexts and is compatible with the Irish Primary School Curriculum.

The Inquiry Cycle is a model of the learning process that emphasises five dimensions or categories as **- ask, investigate, create, discuss and reflect**. All of these overlap, and not every category or step is present in any given inquiry. Each step can be embedded in any of the others, and so on. In fact, the very nature of inquiry means that these steps are mutually reinforcing and interrelated. Together, they comprise a cycle that can be used to inform and guide educational experiences for learners.

Digital Literacy in Primary Schools

Based on our review of theory we established the following definition of digital literacy in primary school contexts:

Digital literacy in primary schools involves pupils and teachers using digital technology to enable, sustain and enrich all aspects of the inquiry cycle of learning as: ask, investigate, create, discuss and reflect.

Participating Schools

The research was based on classroom observations and interviews with teachers and principals from four schools in the vicinity of the Digital Hub in Dublin:

- Scoil San Seamus CBS Primary, Basin Lane, James Street, Dublin 8
- Mater Dei National School, Basin Lane, James Street, Dublin 8
- Presentation Primary School, Warrenmount, Dublin 8
- Francis Street CBS, Francis Street, Dublin 8

In all, we investigated eight cases:

Case 1 **'Bills New Frock,' Fourth Class, Scoil San Seamus CBS**

Case 2 **'Vikings', Fourth Class, Mater Dei NS**

Case 3 **'The Digital Dog', Fourth Class, Francis St CBS**

Case 4 **'How to Make a Banana Split', Third Class, Scoil San Seamus CBS**

Case 5 **'The Three Little Pigs', Third Class, Presentation Primary School**

Case 6 **'Fractions', Third Class, Francis St CBS**

Case 7 **'Memories', Fourth Class (1) & (2), Presentation Primary School**

Case 8 **'St Patrick', Mater Dei National School**

Component Checklist used for Observations

To facilitate data collection and analysis, a specific research instrument was devised - a Component Checklist used by observers to categorise classroom activities.

This checklist was based on the **five inquiry cycle categories** (ask, investigate, create, communicate and reflect) and five other categories identified as significant – participation (depth), participation (scope), print literacy, media ecology and digital literacy. The intent was that this component checklist would also form the basis of the eventual digital literacy framework. The component checklist was subject to review and improvement at an early stage of the research process.

The aim was to enable researchers to describe and compare classroom activities in terms of learning as inquiry and to provide additional data on pupil participation (in terms of depth and numbers), the integration of print literacy, the use of media and artefacts (media ecology) and finally digital literacy.

Findings

The findings of this process are summarised briefly as follows:

- The use of digital technology was generally observed as embedded within structured learning activities directed at curriculum learning outcomes rather than as an end in itself.
- Teachers used tools such as the digital camera, audio devices as well as classroom computers to engage pupils in different roles and to facilitate inquiry learning and group work.
- Digital outputs such as photo-stories, podcasts and video served as project goals and were usually the culmination of a broad range of preparation and production activities.
- Reading and writing activities were frequently integrated into the planning and content components of digital productions.
- High levels of class participation were generally observed – this may be due in part to the nature of project-based activities; however, the use of digital devices also contributed to increased levels of interest and engagement by providing meaningful roles (e.g. as photographers) and purpose (e.g. making a storyboard).
- It is legitimate to describe 'digital literacy' as associated with a classroom, provided that it is understood as a shared attribute connected with the activities and all the people involved.
- We present the Inquiry Cycle Activity Summary (see Appendix 1) as a practical framework for conceptualising digital literacy and print literacy for use in planning and assessing class activities. Use of these checklists ensures that the focus is on meaningful learning rather than just class participation.
- Given the parameters of the current study, it was not possible to examine whether the digital literacy activities in which pupils engaged had an impact on their print literacy skills. The duration and scope of the study did not allow for a detailed analysis of the effects of engagement in digital literacy activities on print literacy over time.

Recommendations

Several specific recommendations arise from the findings of this research:

(1) Digital literacies should be considered as embedded in the pedagogic practices of primary school classrooms. As such, when we seek to nurture and develop specific digital skills in pupils we should do so through inquiry learning activities for broader curriculum goals.

(2) Teacher pre-service training and professional development in relation to the use of digital media in the classroom should centre on pedagogic as well as technical competences. We argue that there is little value in emphasising digital usage as an end in itself and suggest that the emphasis should be placed on instructional strategies that harness digital technologies for learning outcomes. We have provided an **Inquiry Cycle Activity Summary** template to support this process (see Appendix 1).

(3) Project learning, group work, field trips, creative expression and many other teaching strategies that foster inquiry learning are given new impetus, vitality and effectiveness through the integration of digital media in the process. In this regard, we observed a variety of digital tools in use in primary classrooms – digital cameras, video cameras, audio recording devices; animation, picture story and text captioning software were especially popular. We recommend that schools consider the pedagogic potential of a broad range of digital technologies alongside the more frequent emphasis on the need for more and better computers and network access.

(4) The relationship between digital literacy and traditional (print) literacy is complex; we suggest that the most useful approach for primary teaching is to consider how ICT skills and reading and writing skills are closely connected in everyday use. Activities that involve the use of scripts, storyboards, captions and narrative are examples of situations where print literacy skills may be furthered through digital media activities. International research has shown that teachers need to actively structure such opportunities to harness the full learning potential. We recommend that teacher pre-service training and on-going professional

development give special attention to instructional strategies that combine print literacy and digital literacy activities.

(5) We found evidence that digital media promote high levels of engagement and participation in classroom activities. This may be due to the fact that digital outputs such as podcasts, videos, photo stories or animations act as broad project goals capable of providing meaning and purpose to a range of activities. Group work involving different roles (such as photographer and note taker) and capable of involving pupils of different abilities were useful in facilitating high-levels of engagement. We believe that these high levels of engagement, if sustained over time, will lead to improved performance including but not limited to, print literacy scores. We recommend that, in teacher professional development, special attention is given to instructional strategies that promote participation, inclusion, and diverse roles for working in groups.

Introduction

The importance of digital literacy

Digital literacy is an important and often misunderstood concept; it has implications for all aspects of primary schooling in Ireland. The purpose of this research is to establish a useful definition and conceptual framework through which the nature of digital literacy can be examined in terms of classroom practice and thereby related to the underpinning policy and support structures.

What is digital literacy and why is it so important in the context of education in the 21st Century? When we use the term literacy in the everyday sense we often refer to a set of skills associated with the ability to read and write. But a deeper look shows that literacy is much more than isolated skills, and that it extends beyond reading and writing as usually conceived. Literacy implies the capacity to communicate meaning – from speaker to listener and from writer to reader - with all of the participants actively engaged in constructing that meaning. We find in today's digital world that there are many forms of communication: text messaging, e-mail, pictures, and video are but a few.

Adults can reflect on their own childhood and ask themselves how many new forms of communication are available today and were not part of their childhood experience. Digital literacy is often described as a new literacy because we as adults get to name the world. But it is not new for our primary school children; they have not known the time before. We now have a task to prepare our children for a future – a future that we cannot predict. As Dewey (1938) suggests, the best we can do is to help them experience the present world to its fullest extent. This involves extracting meaning from experience.

Today's digital technologies make it possible to capture the world through pictures, sounds, audiovisual sequences or animations and to assemble and present all of these with or without text. In this way children of all ages and abilities can engage with the world and make their own meaning. This is why we need to understand digital literacy and how it connects to learning and teaching.

The Digital Hub Development Agency Elevate Learning Initiative

This research was carried out in four disadvantaged schools in the Liberties area of Dublin. These schools are part of the Digital Hub Development Agency's *Elevate Learning Initiative.*

The Digital Hub Development Agency was established by the Irish Government in 2003 to create an international centre of excellence for knowledge, innovation and creativity focused on digital content and technology enterprises. The *Elevate Learning Initiative* is a broad approach to community learning focused on empowering both learners and tutors through engagement with digital technologies. The overall aim is to build an active and productive knowledge community for 21st Century Ireland. *Elevate* works with local schools to assist them to develop their ICT plans and to support the integration of digital technology in the classroom.

In practice, this support is delivered through a range of professional development programmes for teachers as well as school visits by the *Elevate* learning team. In this way teachers are assisted in using technology in their everyday teaching activities.

A Farrell Grant Sparks' (2007) report provided an evaluation of the precursor to *Elevate,* the Diageo Liberties Learning Initiative (DLLI). Within this initiative a range of actions took place to support the development of digital skills among pupils in 11 primary and 5 post-primary schools in the Liberties area of Dublin. Over the period reviewed – 2002-2006 – 3,500 pupils, many of whom were living in disadvantaged circumstances, took part in the initiative.

These schools had engaged in a range of activities designed to enhance digital competence, including video story telling, clay animation, podcasting techniques and photo stories. DLLI provided the hardware and software needed for the projects, extensive teacher training, and ongoing support with both technical and curricular aspects of project implementation.

A section of the FGS report focused on the benefits to teachers and pupils of using these techniques. Teachers reported enhanced ICT confidence and skills among themselves and their pupils. Principal teachers reported improved levels of engagement in learning and greater inclusion in classroom activities of pupils who

were considered academically weak. Principal teachers also commented on the importance of the teacher professional development provided by DLLI. The pedagogical approach engendered by the school projects was found to promote a constructivist approach to learning and in particular, the weaker pupils found learning to be more relevant to their needs (Farrell Grant Sparks, 2007).

Educational Disadvantage

This current study, although framed in the context of schools in the hinterland of the Digital Hub, is intended to have relevance for all primary schools in Ireland. It addresses the wider questions of digital literacy and learning in the classroom. It could be argued that the four schools featured in this investigation were especially fortunate to receive help and support from the *Elevate* initiative. However, this view should be balanced by a wider appreciation of the fact that these schools were classified as educationally disadvantaged (DEIS Band One).

The context of disadvantage is an important consideration - the Education Act (1998) defines educational disadvantage as:

> ***"…the impediments to education arising from social or economic disadvantage which prevent students from deriving appropriate benefit from education in schools."***

The cases studied in this research featured class and school contexts that fall well within this description of educational disadvantage. Our interviews with teachers and school principals provided evidence of the serious challenges facing educators in such circumstances.

From the perspective of this research the important point is the extent to which our findings may be generalised to other school contexts – other DEIS schools, rural schools, bigger and smaller schools. The research team was conscious of this question from the start. We decided that our analysis would focus on class and project-based cases rather than wider school contexts. We did not confine our investigation to technology-savvy teachers – in many cases teachers were using the hardware and software for the first time. Our overall guidance to the participating teachers was to develop a project activity over a number of weeks and to use

technology where they felt it would be appropriate. We asked the teachers to decide for themselves what they would do and how they would carry out the task.

Our investigation focused on instructional activities that used everyday digital technologies – our context was the *Elevate* initiative and the schools in the area of the Digital Hub. What we were really concerned to find out was what do teachers **do** when they have access and the capacity to use digital technologies to support learning and how can we relate our findings to the construct of digital literacy.

Research Questions

The specific tasks identified at the beginning of this research project were as set out below:

> ***(i) Draw on emerging theories of literacy to develop a framework for conceptualising digital literacy in the context of Irish primary education;***
>
> ***(ii) Investigate digital media practices in primary school classroom contexts;***
>
> ***(iii) Investigate the nature of pupil engagement and participation in digital media practices to determine the adequacy and fit of the newly developed framework***
>
> ***(iv) Examine the connection between digital media practices and the development of traditional (print) literacy skills.***

These tasks may be translated into a series of research questions that needed to be addressed within the context of Irish primary schools:

How should we define digital literacy?

How are teachers using digital technologies in the classroom?

How can we relate digital media to instructional practice?

How can we compare and relate digital literacy to print literacy?

These questions may be summarised in one overarching question that governs this investigation. This question is: **how do digital media practices relate to learning and teaching in the Irish primary school?** This question is at the heart of our inquiry and it is crucial for how we conceptualise digital media in the classroom. It is worthwhile considering this question in more detail.

When we use the term 'digital media practices' we mean pupils and teachers performing tasks and activities that involve digital media such as still cameras, video cameras, and audio recording devices, and using software to build picture stories, create web sites, interact on-line, edit material, and present digital outputs. We suggest that the focus should be on the notion of practice rather than on the technology or media per se. We use the term 'practice' to mean the activities that take place and the goals and purpose of these activities. To put it simply, practices are what we do.

What we are suggesting in the question above is that there is a need to establish a framework to describe the connection between digital media practices and learning and teaching practices in schools. This is why we need to clarify what we mean by digital literacy in the classroom. Is such literacy adequately described by a list of technical skills? What of the purposes to which media practices are applied? Surely the goal of classroom practices is to facilitate learning and therefore we will need to connect our conception of digital literacy with our understanding of the learning process.

Theoretical Review

History of Literacy

Literacy has been over the past seven thousand or so years a mirror of our development as social and cultural beings. Early manifestations of literacy were at the heart of people's attempts to understand and influence the natural forces which constrained their lives. It has always been connected with power and control. From the beginning, writing was also a tool by which the mighty could aspire to the immortality enjoyed by the Gods, a political weapon through which a King could proclaim superiority to others and a means of enacting and interpreting laws.

For the literate few, literacy itself had a twofold meaning. First was the ability to read and write, typically a complicated and demanding activity to perform. This was inextricably bound up with a second meaning: that of a learned person, versed in the knowledge and wisdom gained from participation in the activities of the community of the literate, the literati, this also meant membership of a highly privileged social group, usually a priestly class.

Literacy and Power

From a broader perspective, we can see that literacy was deeply embedded in the social order and had powerful meaning for all members of society. It was also bound up with its material representations, whether those be cuneiform tablets, papyrus, or cylinder seals - the technologies of the day (Haas, 1996). Literacy was thus embedded within the process of communication in society, intertwined with other symbolic systems, of pictures, gestures, signs, and language. We can describe literacy as situated, embedded in the uses and contexts of communication and thus in the social, political, spiritual, technological and cultural structures of society. The conception of literacy as simply a set of reading and writing skills misses much of this meaning and force.

Viewed in this way, literacy can best be understood as part of the reservoir of meaning possessed by a particular society; we may therefore regard literacy as 'shared understanding' rather than a set of competencies in reading and writing. For those who could not read as much as for those who could, texts carried powerful messages: the awesomeness of the gods, the might of the ruler, the magical power of the

priests, the rightness of the social structure and the place in it of the ordinary majority. Thus even the unlettered were implicated in the practice of literacy.

Literacy and Communication

Literacy was thus tied up inextricably with the whole process of communication in society, intertwined with other symbolic systems, of pictures, gestures, signs, and language. We can describe literacy as situated, embedded in the uses and contexts of communication, and thus in the social, political, spiritual and cultural structures of society. Thus, seeing literacy as simply a set of reading and writing skills misses much of its meaning and force.

The rise of industrial society saw a change in the perception of literacy. It remained a mark of elite status, the monopoly of interpretation of sacred signs being superseded by the shared literary culture of the elite, now also bought into by the rising middle classes. For this group literacy was also a functionality linked to the management roles of industrial society. There was also awareness that the ability to read and write was an issue for ordinary people, justified by functionality (making them better workers) or social control (making them more obedient citizens). Debates over schooling in the late eighteenth and nineteenth centuries showed that literacy was not just about mechanical skills, although literacy itself became increasingly perceived as such (Olson & Torrance, 2001).

Literacy in the 20th Century

By the latter half of the twentieth century, the notion of literacy had moved from mechanical skills (of reproducing letters and words) onto psychological notions of competence in reading and writing. The emphasis was moved away from achieving literacy for the great majority toward combating illiteracy by addressing the problems of "deprived" groups or individuals (Triebel, 2001). Despite the efforts of educators of the past twenty years or so, children living in disadvantaged circumstances continue to exhibit low levels of literacy, a contributing factor may be the strong skills emphasis underpinning many intervention programmes. However, other factors such as low levels of parental support, low levels of access to educational resources in the home, high absenteeism, low levels of parental income will also contribute to the problem.

This approach to literacy has, however, over the past four decades, been challenged by new approaches questioning the exclusive focus upon the cognitive and manual mechanics of reading and writing. It is now argued that literacy activities happen in a social, cultural and technological context, and are created and sustained by factors within that context – literacy is a social product and language itself is interactive and dynamic (Barton, Hamilton, & Ivanic, 2000; Bruce, 2003; Olson & Torrance, 2001; The New London Group, 1996). Thus the subject matter of literacy and the uses to which it is put are key parts of the equation – literacy action is part of social, political, economic and cultural change (Elwert, 2001).

Digital Literacy

The digital has now entered this equation. From the literacy-as-skills perspective, digital tools offer some new ways to enable the mechanics of reading and writing – for instance, a word processor can "cure" untidy writing. From this perspective too, digital competences can be seen as a separate set of skills – knowing which buttons to press to achieve desired effects. However, literacy and the digital are more subtly bound together. The digital has given to literacy new means of expression and new means of understanding. But it has not changed the central social and cultural significance of literacy in its broadest sense.

In many ways the evolution of ideas of computer literacy echoes that of literacy itself. Computers were from their very beginning seen as almost magical, understood only by white-coated "boffins". It was clear that they were going to affect the way we live, and this was seen in literature and popular culture.

Computer Literacy

From the late sixties, educators grappled with the idea of how to engage children with the new technology and the term *computer literacy* appeared in the mid-1970s. When desktop personal computers appeared at the end of the 1970s, programming became part of computer literacy; it was argued that knowing programming helped you to understand how computers worked but also that programming, like Latin, was "good for the brain". However, during the 1980s useful applications (especially word processing, spreadsheets and databases) and low-cost peripherals (especially printers and disk-drives) at last made

personal computers actually useful in real life for ordinary people. The emphasis in computer literacy moved to teaching the use of these applications, and more functional justifications were used.

The term digital literacy has been popularised by Paul Gilster, who, in his book of the same name defined it as:

> ***the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. The concept of literacy goes beyond simply being able to read; it has always meant the ability to read with meaning, and to understand. It is the fundamental act of cognition.***

(Gilster, 1997 p 1-2)

Gilster identifies critical thinking rather than technical competence as the core skill of digital literacy. He also emphasises the relevant use of skills in life and that digital literacy is more than skills or competences.

This emphasis is further developed in Allan Martin's definition of digital literacy for the DigEuLit Project:

> ***Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process.***

(Martin, 2006 p 19)

The key element of this definition is that digital literacy activity arises out of the individual's life context; it may concern work, study, leisure or any other aspect of the life context.

It is not unusual for new "literacies" to emerge at different times and this perspective helps locate the present discussion on digital literacy as one of societal adaptation rather than solely a response to a new technology. New literacies come with sets of assumptions and an implicit understanding that certain meanings can be shared. In fact the way in which communication is coded says a lot about who is and who is not

considered important on the part of the initiator. Young people share instant messages with their own condensed word codes; these are as much to do with their social identities as efficient texting (Lewis & Fabos, 2008).

As is the case for literacy in general, digital literacy has a power dimension; in the last few decades, it has transformed from technical or specialist literacy into an everyday literacy deeply rooted in the way we organise our society and the way we go about economic development. Teaching digital literacy has therefore to do with preparation of pupils for future participation in an evolving society where digital technologies are deeply embedded in the associated structures and processes (a very important issue that goes beyond the scope of this study).

Digital literacies and print literacies

Teachers, especially those working in schools designated as socio-economically disadvantaged, who perhaps spend significant amounts of time using digital technologies in class, may wonder if there is a cross-over to traditional print literacies. Specifically, they may ask if they can expect to see an increase in pupils' scores on standardised tests of reading achievement as a result of greater pupil engagement with digital media.

In Ireland many of our DEIS schools are struggling to achieve high reading scores and they are seeking interventions, "the silver bullet", to help their pupils. Some seek a "technical fix" (Selwyn, Gorard, & Williams, 2001) to educational disadvantage, with improved reading test scores as the appropriate indicator of success. However, international research points to a complex relationship between reading scores and digital literacy skills and those who expect a quick and easy solution to low reading achievement may be disappointed.

What do standardised tests actually measure?

First, we need to consider what traditional standardised tests of reading achievement actually measure. At the First and Second classes in primary schools, these tests mainly assess word identification skills – the ability of pupils to analyse, retrieve and understand words. From Third class on, the emphasis shifts to comprehension of texts, and readers must draw on a deeper well of background knowledge as well as a bigger repertoire of higher-level reading comprehension skills to maintain progress.

Coupled with this, it is recognised that factors beyond the control of schools may impact on pupils' performance on standardised tests of reading. These include a pupil's socioeconomic status and that of his/her peers, the support children receive in developing language and other skills at home, access to learning resources (e.g. books, computers) at home and parent's attitudes towards education and schooling. Hence, while schools may control factors such as the quality of teaching and learning, the level of control they can exert over external factors may be limited. At the same time, many standardised tests have not as yet migrated to digital format, so pupils may not get a chance to demonstrate their newly-acquired digital literacy skills. It is also questionable whether such a migration would in the end prove to be a straightforward exercise – the situated literacies approach as argued here emphasises shared practices rather than individual skills.

Key skills that digital literacy can promote

Warschauer (2007) identified key skills that digital literacies can promote. These overlap to some extent with the definitions of digital literacy presented earlier and include aspects of multi-media literacies. According to Warschauer, the following are the key informational literacy skills that young people should acquire:

- The ability to define what sorts of information are needed for a task
- locate the needed information efficiently
- evaluate information and its sources critically
- incorporate selected information into one's knowledge base
- understand legal, social and economic issues around the use of information
- access information ethically and legally

Similarly, Leu et al. (2008) have framed online comprehension as generating important questions and then locating, critically evaluating, synthesising and communicating possible solutions to those questions online. Referring specifically to reading on the Internet, they note that online comprehension is defined not only by the purpose, task and context but also by a process of self-directed text construction.

In addition to specific comprehension skills, Warshauer identified important multi-media literacy skills that are particularly relevant to the current study including interpreting, designing and creating content that makes use of images, photographs, video, animation, music, sounds, texts and typography.

Skills in the curriculum

Clearly, the skills identified by Warshauer and Leu et al., especially those relating to information literacy but also ones involving text and typography, overlap to a strong degree with what might be described as traditional higher-level oral language, reading and writing skills. If we look at the Primary School English Curriculum – Content (1999), for example, we find reference to the following key oral language, reading and writing skills:

- ***adopt an active approach to a text by posing his/her own questions (First/Second classes, Reading)***
- ***use information retrieval skills in cross-curricular settings (First/Second, Reading)***
- ***develop basic information retrieval skills – using chapter headings and index, interpreting diagrammatic information, scanning and skimming (Third/Fourth classes, Reading)***
- ***develop a range of comprehension strategies to deal with narrative, expository and representational reading material – inference, analysis, evaluation, summarisation (Third/Fourth classes, Reading)***
- ***distinguish between fact and opinion, and bias and objectivity, in text and in the media (Fifth/Sixth classes, Reading)***
- ***find information relevant to his/her purposes in non-fiction texts, graphs and pictorial and diagrammatic data, and through the use of information technology (Fifth/Sixth classes, Reading)***
- ***choose a form and quality of presentation appropriate to the audience (Fifth/Sixth classes, Writing)***

- ***the child is encouraged to ask questions, to predict outcomes and to discuss solutions to problems. He/she is also given opportunities, both orally and in writing, to experience activities such as justifying an attitude or arguing a point of view.***

- ***particular attention is paid to developing higher order thinking skills such as evaluation, analysis, inference and deduction, and the child is encouraged to use writing in order to clarify thought.***

Warschauer argues that the skills fostered by digital media make traditional literacy skills (such as those noted above) 'more valuable than ever' (2007 p 43). Related to this, he states that 'competence in traditional literacies is often a gateway to successful entry into the world of new literacies' (p 43). Conversely, he argues that pupils who are not competent in traditional literacies might be limited in their ability to benefit from the new literacies.

Study of computer usage by 11-14 year-olds in New York

In a study of computer usage by 11-14 year-olds in New York city, Attewell and Winston (2003) found that, while children from affluent families (typically good readers) had little difficulty posting messages on bulletin boards, reading text online, participating in on-line polls and contributing to the development of a website, those from less-affluent families (typically poor readers) used multimedia to avoid reading texts rather than a means of expanding their knowledge. The implication here is that the observed digital divide was based on differences in pupils' reading ability (traditional literacies) rather than on differential access to digital media (new literacies). Indeed, Warschauer noted that the limited reading ability of the less-affluent pupils substantially reduced the possibility that they would engage with information literacy (regarded as a component of digital literacy).

Absence of topic knowledge (sometimes referred to as cultural literacy or world knowledge), can be an impediment both to acquiring reading literacy (most texts assume some knowledge of the topic) and digital literacy (processing of electronic text also requires topic knowledge). As pupils develop independence in reading, they

need to draw on knowledge of a broad range of topics. Unfortunately, children in disadvantaged circumstances may lack the key topic knowledge to understand some texts whether in printed or digital format; hence their ability to apply and reinforce relevant comprehension strategies may be limited.

Another important prerequisite for reading successfully is basic word identification/recognition skills. It is easy to see how the application of comprehension skills in digital contexts might enhance traditional comprehension skills, particularly for those who can read with some degree of independence. It is more difficult to see how engagement with digital texts would enhance print reading skills for children who are struggling with learning to read, unless teachers ensure that work with digital texts includes specific activities aimed at developing and applying such reading skills.

To read and learn successfully children need to be engaged

Finally, in order to read and learn successfully, children need to be highly engaged. In the context of language learning, Cummins (2001) refers to a need for children to maintain maximum cognitive engagement, maximum investment, and a critical focus on linguistic meaning, form and use. These elements have also been identified by Warschauer as important for digital media lessons, especially for children in disadvantaged circumstances.

A more recent study in the US by Karchmer (2008) looked at how 13 teachers' report on how the Internet influenced literacy and literacy instruction in their classrooms. Karcher's findings indicated that the teachers viewed the Internet's influence on reading as an extension of traditional literacy skills. Further, primary teachers noticed an increase in their pupils' motivation to write when their work was published on the Internet. Interestingly these findings did not hold true for secondary teachers.

While digital literacy can promote autonomous learning, learners need extensive teacher support to reach that point

These observations point to the key role of the teacher in developing both traditional and digital literacies. But there is a paradox. While digital literacy can

promote autonomous learning, learners need extensive teacher support to reach that point. Hence, unstructured activities, where children are left to their own devices as they engage with digital texts, seem to be of limited value. Referring specifically to digital writing in the early years Merchant (2008) notes:

> ***In reflecting the general shift of emphasis from whether to use ICT to how to use ICT in literacy, there is a need for more careful consideration of digital writing. In particular, there is scope for more work that shows how digital writing can be embedded in classroom practice in ways that provide authentic contexts for learning, meaning making and communication. Because digital writing involves new kinds of skills and new kinds of social practices, however, it cannot be simply grafted unto existing instructional practices and curricular objectives.***
>
> (p 769)

Suggested activities to promote digital literacy and learning

Marchant suggests that there is more to be done in developing classroom practice and he suggests the key may lie in authentic contexts for learning, meaning making and communication. In this way multi-media skills may be introduced on a needs basis, while also ensuring that informational literacy and traditional reading/writing skills are supported.

Based on the preceding discussion the following are examples of appropriate activities:

- Integrate opportunities for extensive reading and writing into digital literacy activities (for example, children can engage in extensive background reading around a new topic or write an account of what they have done).
- For each digital literacy activity, select 5-6 key vocabulary words or phrases, and teach them directly to pupils. Review these new vocabulary items on an ongoing basis.

- In developing reading comprehension in digital environments, provide opportunities for guided reading practice, where comprehension strategies are modelled, and children are expected to explain which strategies should be used and why.
- Capitalise on the sense of audience that digital literacies can provide – children can be encouraged to pay stronger attention to issues of syntax, vocabulary, mechanics, and structure in their writing, if they know that their work will be read by others.
- When children engage in digital literacies, encourage them to describe what they are doing, and how they can use what they have learned in other contexts (e.g., in dealing with print literacies).

This section began by considering the possible effects of digital literacies on pupils' performance on standardised tests of reading. However, research by Black and William (2005) and others suggests that a range of classroom-based assessments such as projects, portfolio assessment, oral presentations, and self-assessment can all contribute to enhanced pupil learning, and stronger performance on standardised tests. These assessment tools – often called 'assessment for learning' tools (NCCA, *Assessment in the Primary School Curriculum: Guidelines for Schools*, 2007) – are ideally suited to digital literacy activities, which are often more interactive than traditional classroom teaching and learning.

The Inquiry Cycle – theoretical underpinnings

Inquiry-based learning is often described as a philosophical and pedagogical response to the changing needs of the information age, but its roots are much deeper. It assumes that all learning begins with the learner: what people know and what they want to learn. This idea appears in the earliest writings on education, including Plato and Socrates in the West and Confucius in the East but is more commonly traced

back to Rousseau and Pestalozzi. Its fullest articulation can be found in the writings of John Dewey (1938).

For Dewey the connection between what happens in the classroom and lived experience outside the school walls is essential for successful education. The best education constantly reconstructs experience, relating it to both the past and to contemporary life. As Dewey (1938 p 15) points out

> ***We always live at the time we live and not at some other time, and only by extracting at each present time the full meaning of each present experience are we prepared for doing the same in the future. This is the only preparation which in the long run amounts to anything.***

Thus, inquiry requires active learning in authentic contexts. Authentic contexts require that teachers, pupils, and community members become partners in inquiry, including inquiry into the world and inquiry into pedagogy.

Thus, curriculum can be defined differently to it being a set of skills to be mastered or as a set of concepts to be learned. Dewey argued that we need to build curriculum around the impulses or instincts, of the learner:

> ***(i) the social instinct – conversation, personal intercourse, and communication;***
>
> ***(ii) the instinct of making – the constructive impulse;***
>
> ***(iii) the instinct of investigation – doing things and watching to see what happens;***
>
> ***(iv) the expressive impulse – the desire to extract meaning from experience.***

Dewey saw these impulses as the natural resources, or the un-invested capital of education, out of which active learning grows. If people are to understand and participate fully in the complex world in which they live, they need to have opportunities to engage with challenging problems, to learn through hands-on investigations, to have supportive experiences, to articulate their ideas to others and to explore a variety of resources in multiple media.

We are all participants in inquiry, not spectators: we change a problematic situation and are changed in turn through our actions. This leads to a view of inquiry as, "the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole" (Dewey, 1991/1938 p 108).

Indeterminate situations are those in which a person finds conflict between current needs and realities. The indeterminacy can range from feeling cold to being puzzled about an historical event. That feeling of indeterminacy is then the driving force of inquiry causing the individual to put on a coat in the former case or to make a trip to a library or the Internet, in the latter. In each case, the inquirer seeks to establish a unified whole, one that replaces the indeterminacy with a unity. Inquiry is not a purely mental act, separate from action: putting on a coat can be as much an instance of "directed transformation" as reading a text. In fact, it is the integration of mind and body in action that constitutes the transformative aspect of inquiry.

This account is descriptive, not prescriptive. The "controlled or directed transformation" of indeterminate situations is simply what we do as purposive organisms. Learning is our capacity to reflect upon that transformation and to realise that we can achieve a unified whole when faced with similar situations in the future. In that sense, inquiry-based learning is not a method or an option to consider for teaching and learning; instead, it is what happens when people do learn.

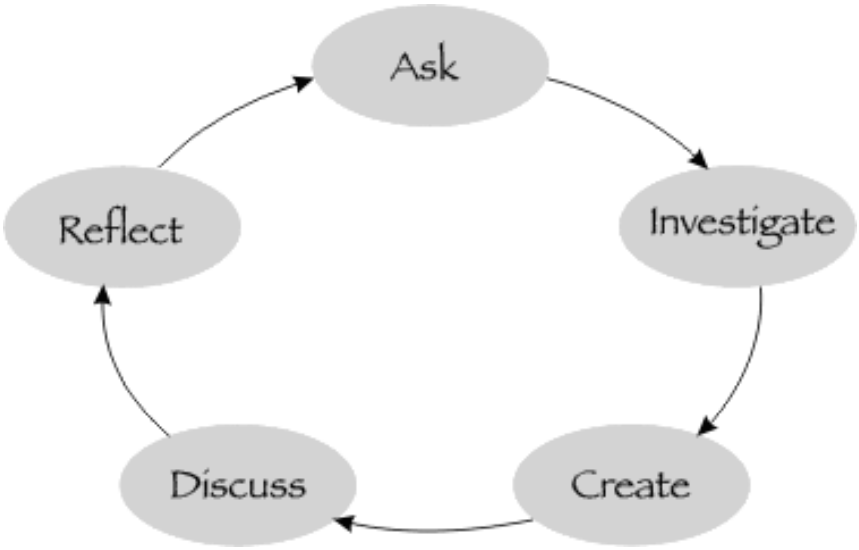
The emphasis in Dewey's concept of inquiry is on transformation, on remaking the world along with ourselves. Because situations often include interactions with others, inquiry typically involves collaboration. The usual categories (teacher/pupil, technology/concept, knowledge/skill) are replaced with a need to understand the process of transformation: What means are employed to transform an indeterminate situation? What are the varied roles played by tools, ideas and people in inquiry? How does an inquirer evaluate the unity of a situation? How do multiple inquirers coordinate their activities? How do individual experiences and needs coordinate with those of the community?

For Dewey, and others involved with this educational perspective, the problems of education were not located in what we teach or how we teach, but rather in the breakdown of connections between individual and community, between formal learning and lived experience and between the means and ends of problem solving.

From this perspective, the situation set up within formal education is often so far removed from the situation of life outside that learning has no meaning and remains in what Dewey calls a "water-tight compartment" (Dewey, 1991/1938 p 48).

Drawing from Dewey's four impulses, his stages of reflective action and the fundamental idea that learning begins with the curiosity of the learner, we can envision a spiral path (Figure 1) of inquiry: asking questions, investigating solutions, creating, discussing our discoveries and experiences, and reflecting on our new-found knowledge and asking new questions (Bruce & Bishop, 2002). Each step in this process naturally leads to the next: inspiring new questions, investigations and opportunities for authentic *teachable moments*. Each question leads to an exploration, which in turn leads to more questions to investigate (Bruce & Davidson, 1996).

Figure 1. The Inquiry Cycle



We need to interpret the cycle as suggestive, neither the sole, nor the complete, characterization of inquiry-based learning. Inquiry rarely proceeds in a simple, linear fashion. The five dimensions in the process - ask, investigate, create, discuss, reflect - overlap, and not every category or step is present in any given inquiry. Each step can

be embedded in any of the others, and so on. In fact, the very nature of inquiry is that these steps are mutually reinforcing and interrelated. Together, they comprise a cycle that can be used to inform and guide educational experiences for learners.

Ask

Ask reminds us that inquiry develops from a question or problem arising out of experience. Meaningful questions are inspired by genuine curiosity about real-world experiences and challenges. Viewed in process terms, one can say that a question or a problem comes into focus, and the learner begins to define or describe what it is, for example:

> ***What makes a poem poetry?***
> ***Where do chickens come from and how does an egg 'work'?***
> ***Why does the moon change shape?***

But inquiry does not always start with a well-articulated question; questions themselves arise from reflection and action in the world, including dialogue with others. Elspeth Huxley states this well:

> ***The best way to find things out ... is not to ask questions at all. If you fire off a question, it is like firing of a gun - bang it goes, and everything takes flight and runs for shelter. But if you sit quite still and pretend not to be looking, all the little facts will come and peck round your feet, situations will venture forth from thickets, and intentions will creep out and sun themselves on a stone; and if you are very patient you will see and understand a great deal more than a man with a gun does.***
>
> **(Huxley, 1959 p 272)**

Investigate

Investigate relates to the varieties of experience possible and the many ways in which we become part of an indeterminate situation. It suggests that opportunities for learning require diverse, authentic, and challenging materials and problems. Because experience includes interactions with others, there is also a moral dimension to inquiry. Similarly, physical, emotional, aesthetic, and practical dimensions are inherent in inquiry, and are not merely enhancements or add-ons.

Through investigation, we turn curiosity into action. Learners gather information, study, craft an experiment, observe, or interview. The learner may recast the question, refine a line of query, or plunge down a new path that the original question did not, or could not, anticipate. The information-gathering stage becomes a self-motivated process that is owned by the engaged learner.

Create

Create picks up the "controlled or directed transformation" part of Dewey's definition. This term insists that inquiry means active, engaged hands-on learning. Inquiry thus implies active creation of meaning, which includes new forms of collaborating and new roles for collaborators. As information begins to coalesce, the learner makes connections. The ability at this stage to synthesise meaning is the creative spark that forms new knowledge. The learner now undertakes the creative task of shaping significant new thoughts, ideas and theories extending his/her prior experience.

Discuss

Although inquiry has a personal aspect to it, it is also part of our participation in a community. Discuss involves listening to others and articulating our own understandings. Through discussion (or dialogue), construction of knowledge becomes a social enterprise; learners share their ideas and ask others about their own experiences. Shared knowledge is a community-building process, and the meaning of their investigation takes on greater relevance in the context of the learners' society. Learners compare notes, share experiences, and discuss conclusions, through multiple media, including now online social networks.

Reflect/Express

Reflect tells us that only the inquirer can recognise the indeterminate situation and further, say whether it has been transformed into a unified whole. Reflection means expressing experience, and thereby being able to move from new concepts into action. Reflection may also mean recognising further indeterminacies, leading to continuing inquiry. Reflection is taking the time to look back at initial questions, the research path and the conclusions made. The learner steps back, takes stock, makes observations and new decisions. Has a solution been found? Do new questions come to light?

And so it begins again; thus the circle of inquiry.

The Inquiry Cycle and the Irish Primary School Context

This research does not stand alone. It should be considered alongside other Irish primary school research and policy documents. In this section we situate the Inquiry Cycle within the philosophy of the Irish Primary Curriculum. We also show how the cycle is supported by recent publications on the use and integration of ICT in Irish schools.

The Irish Primary School Curriculum and the Inquiry Cycle

The Irish Primary School Curriculum was completely revised in 1971 and brought child centered education to the core of classroom activity. The key principles underlining the curriculum put the individual learner's holistic development through discovery and active learning as the basis for a revised pedagogy. The Department of Education and Science conducted a major review of the 1971 curriculum during the 1980s and 90s which culminated in a 1999 revision. This very comprehensive review further reinforced child centered education:

> ***An important goal of the curriculum is to enable children to learn how to learn, and to develop an appreciation of the value and practice of lifelong learning.***
>
> (Primary School Curriculum Introduction, 1999 p 7)

Since the publication of the curriculum there have been many societal and technological changes in Ireland and these have impacted how schools address learning and teaching. The philosophy underpinning the curriculum is the basis for schools' pedagogical practices and it recognises the need for schools to respond to changing circumstances. In addition, various educational agencies have published other reports and recommendations to assist schools in reforming practice to take account of the ever changing societal influences on education. The *Introduction to the Curriculum* acknowledges that it should not be static but should respond to change:

> ***Change also involves new behaviours and practices, and ultimately new beliefs and understandings. It involves changes in what people know and assume.***
>
> (Primary School Curriculum Introduction, 1999 p 62)

The curriculum makes reference to the importance of using ICT in literacy development but the scope of the reference is limited by the technology that existed in 1999. The English Curriculum states:

> ***The ability to use information and communication technologies can also help to enhance the child's language development. It can be an important resource in developing reading, comprehension and information retrieval skills. The facility of word-processing can not only encourage and help the child in drafting, editing and rewriting but can underline the fact that this operation is an intrinsic part of the writing process. Because language is a feature of every curriculum area these and other applications of information and communication technologies to learning and teaching can have relevance for the child's development throughout his/her school experience.***

(Primary School Curriculum English: Content, 1999 p 9)

The Inquiry Cycle, as we have defined it, is a recursive process of Ask, Investigate, Create, Communicate and Reflect. The cycle is based on the same principles of discovery learning we see in the primary school curriculum.

Ask in the Curriculum

Ask reminds us that inquiry develops from a question or problem arising out of experience. Meaningful questions are inspired by genuine curiosity about real-world experiences and challenges.

The curriculum emphasises that the impulse for learning is the child's sense of wonder at the complexity of the world, the desire to understand it, and the spontaneous impetus to explore it through play. First-hand experience that actively engages the child with the immediate environment and with those who live in it is the most effective basis for learning (Primary School Curriculum Introduction, 1999).

Investigate in the Curriculum

Through investigation, we turn curiosity into action – learners gather information, study, craft an experiment, observe or interview.

Once the object of inquiry is decided the learner must investigate and seek solutions to the questions in mind. This is the process of active learning through hands on

investigation either individually or through cooperative working. It is at this stage that the learner will choose the tools for the investigation. The curriculum states "It is an underlying principle of the curriculum that the child should be an active agent in his or her own learning" (Primary School Curriculum Introduction, 1999 p 14).

Create in the Curriculum

The learner now undertakes the creative task of shaping significant new thoughts, ideas and theories extending his/her prior experience. The learner has discovered enough information to commence the creation of an artefact which reflects the knowledge gained. In the case studies observed in this research such a process involved pupils using digital tools and media.

Communicate in the Curriculum

Through discussion (or dialogue), construction of knowledge becomes a social enterprise. Learners share their ideas and ask others about their own experiences. The essential element of learning for the learner is the expression of the new understanding through a medium of their choice. Communication can take many forms and must involve others and have an audience. The curriculum states:

> ***In a rapidly changing society effective interpersonal and intrapersonal skills and skills in communication are essential for personal, social and educational fulfilment. The ability to think critically, to apply learning and to develop flexibility and creativity are also important factors in the success of the child's life.***

(Primary School Curriculum Introduction, 1999 p 7)

Much learning takes place through the interaction of language and experience. Language helps the child to "clarify and interpret experience, to acquire new concepts and to add depth to concepts already grasped" (Primary School Curriculum Introduction p 15).

One of the principles on which the English curriculum is based is that the child learns through language, that he/she can use language to clarify images and so facilitate the cognitive organisation of concepts and ideas (see, Primary School Curriculum English: Content, 1999).

Reflect in the Curriculum

In the inquiry cycle the learning takes place through consideration of the previous steps and the understanding gained through this process of reflection.

The curriculum states:

> ***Conceptual development is not necessarily a linear process. It may take place on a number of planes simultaneously or through the making of an intuitive leap. Having dealt with particular knowledge, ideas and skills at a simple level, the child should have the opportunity to return to them at regular intervals in order to deepen his or her understanding.***

(Primary School Curriculum Introduction, 1999 p 14)

The Irish Primary Curriculum and Literacy

As this research is concerned with digital literacy and how technology impacts on traditional literacy it is prudent to consider what the curriculum says about the learning of English:

> ***The English curriculum is concerned not just with language learning but with learning through language***

(Government of Ireland, Primary School Curriculum English: Content, 1999 p 2)

Language learning is an integrated process in which it is difficult to separate the functions of oral language, reading and writing:

> ***All three are intimately related and each interacts with the others in a myriad of ways.***

(Primary School Curriculum English: Content, 1999 p 2)

Much of what the child learns and the way he/she learns it comes from:

> ***.... interaction of language and experience. Through naming, describing, classifying and modifying things and ideas, knowledge is extended and the command of language developed. In this way language subsumes experience.***

(Primary School Curriculum Introduction, 1999 p 6)

We suggest that, as evidenced by the above extracts, the Primary Curriculum advocates a social practice approach to literacy. In the words of the curriculum "language subsumes experience". Overall, the model of learning, based on the Inquiry Cycle is very much in keeping with the principles outlined in the 1999 Irish Primary School Curriculum.

The Inquiry Cycle and ICT Integration in Irish Primary Schools

More recently, publications from the National Council for Curriculum and Assessment (NCCA), National Centre for Technology in Education (NCTE) and the Department of Education and Science provide resources on integrating the new technologies into the curriculum. There is a wealth of advice now available to encourage and support teachers to refine their current classroom pedagogy to reflect the new affordances offered by the use of digital media to enrich learning for their pupils.

In this section we outline how the Inquiry Cycle fits in with 3 other recent publications:

1. *ICT in Schools* - Inspectorate Evaluation Support and Research Unit
2. *Investing Effectively in Information and Communication Technology in Schools 2008-2013* – The Report of the Minister's Strategy Group
3. The NCCA Framework (Revised) – *A Structured Approach to ICT in Curriculum and Assessment*

1 ICT in Schools – Inspectorate Evaluation Studies

This is a very comprehensive report and in reviewing it here we can gain some understanding of the issues surrounding ICT in education which set the context for looking at how the Inquiry Cycle and ICT are interrelated. The report was published in 2008 and it is an evaluation of the infrastructure, planning and use of information and communications technology in teaching and learning conducted by the

Inspectorate in primary and post-primary schools during the school year 2005/06. The report details the infrastructure in schools and makes recommendations for policy development:

> ***The pedagogical rationale for promoting ICT in schools is concerned with the use of ICT in teaching and learning. It is intimately related, therefore, to the economic and social rationales, but ICT also has additional application in the teaching and learning process. It provides teachers with a range of new tools to facilitate traditional pedagogies; it also and perhaps more importantly, presents the teacher with the potential to develop new teaching methods. For the student growing up in a culture of all-pervasive technology, ICT provides new, and more exciting and relevant, learning opportunities.***

(*ICT in Schools* 2008 p 5)

Another important factor for the use of technology in the classroom is the skill set of the teacher. The report states:

> ***Teachers were asked to state their perceived level of proficiency in a number of important ICT skills areas. An analysis of the responses to this question showed that the majority of teachers do not consider themselves proficient in a wide range of ICT skills and applications. In addition, the majority of teachers report their ability to use ICT-facilitated methods and to assess the potential of computer applications and the internet as low.***

(*ICT in Schools* 2008 p 109)

It is not surprising then that the report finds in general, that ICT usage in the classroom is low and there is a lack of understanding and confidence among teachers in learning how to use technology in their teaching. The report states:

> ***It is clear from this examination that the use of ICT is somewhat limited in primary schools, and that the potential for using ICT to develop critical life skills, such as communication, problem-solving and independent working skills, is not being realised.***

(*ICT in Schools p 116*)

The report highlights the potential role for ICT to support quality teaching and learning in our primary schools. However, this is currently only occurring in a small number of schools and the majority of Irish primary teachers are struggling to embed ICT into their daily classroom routines. The report also makes many useful recommendations regarding the integration of ICT into classroom practice which provide an important backdrop and impetus to the research questions addressed here.

2 Investing Effectively in Information and Communications Technology in Schools 2008- 2013 – The Report of the Minister's Strategy Group

The notion of learning as inquiry permeates the pedagogic approaches suggested in the Minister's Strategy Group Report. New tools for learning afforded by digital technology in schools provide pupils with new ways to experience the world and make meaning. New digital technologies may provide a rich variety of stimuli through multimedia, the Internet and mobile devices. Curiosity and questioning can be stimulated in new ways and these affordances are recognised in the Strategy Group report:

> ***Appropriately integrated into what teachers do, ICT facilitates exploration, creativity and interdisciplinary work. When used well, ICT enriches learning and enhances teaching. It invigorates classroom activities and is a powerful motivational tool that encourages learners to progress in more personalised and self-directed ways.***

(*Investing Effectively in Information and Communications Technology in Schools, 2008-2013 The Report of the Minister's Strategy Group*, 2008 p 1)

With many new tools available for research, pupils can now use digital tools to frame and investigate meaningful questions. Digital devices, now cheaply available, can facilitate new methods for recording, storing and showcasing students' work. Skills such as collaboration, problem solving and effective presentation – all important in knowledge economies – are greatly facilitated by new technologies.

> ***Our growing knowledge economy requires an ICT-literate, creative and entrepreneurial workforce which confidently uses ICT for invention, problem-solving and knowledge creation.***

(p 1)

Digital technology enables students to create new content and new forms of creativity and expression. In a world where digital content is freely available and easily shared, students in school can now become users, creators and contributors to the world of media rich content. The Strategy Group Report states:

> ***The pursuit of creativity and inventiveness are now pivotal skills in a knowledge economy and the embedding of ICT in learning can greatly facilitate their development.***

and

> ***Creativity has always been a highly regarded attribute in society. Now it has been identified as a pivotal competence in the networked society and knowledge-based economy.***

(p 1 summary)

The need for expression and communication drives how we interact with others in society. New technology has empowered us to find many diverse ways to express our ideas and show our creativity. The Strategy Group Report also recognises this:

> ***Web 2.0 will facilitate greater interactivity and user-generated content activities. It is crucial that young people acquire the ICT and related skills to take full advantage of these new communication interfaces and opportunities.***

(p 2)

New experiences are given their fullest value when they can be integrated with what is already known through a process of reflection. This is what drives the learner to ask additional questions or seek improvements to what has been created. It prompts further investigations and so continues the cycle of inquiry learning. The Strategy Report states:

> ***Full participation in our knowledge society increasingly requires confidence and fluency in personal ICT usage. The very nature of learning is changing. Teaching must take account of the ICT-enabled styles and methods of learning that students have experienced outside the classroom.***
>
> (p 2)

3 The NCCA ICT Framework - A Structured Approach to ICT in Curriculum and Assessment

The NCCA ICT Framework was published in 2007 and provides teachers with guidelines on the integration of ICT in their teaching. The focus of the framework is to help teachers develop ICT literacy in pupils. They framework identifies 15 learning outcomes that may be applied to four areas of learning defined as:

- exploring the potential of ICT to create, communicate, and collaborate to organise and produce information (Area C).
- understanding and applying knowledge of the functions of ICT including safe practice, maintenance and ergonomics (Area F).
- developing a critical appreciation of the role of ICT in society and habits which reflect ethical and responsible use of ICT (Area S).
- using ICT for **thinking and learning** including managing enquiry, assessing information, solving problems, and expressing ideas across a range of curriculum areas (Area T).

(*ICT Framework A Structured Approach to ICT in Curriculum and Assessment (Revised Framework)*, 2007)

The ICT Framework and practical online support for teaching and learning are available on the ACTION[2] website at http://action.ncca.ie. The site describes many sample activities for each level designed as exemplars for teachers to emulate. The intention is to build this on-line resource and more exemplars will be added over time. The online introduction to the NCCA ICT Framework states:

> ***The ICT Framework offers schools a structured approach to using ICT in curriculum and assessment by identifying the types of learning with ICT (including knowledge, skills and attitudes) appropriate for students during the period of compulsory education. The ICT Framework is not a curriculum area or a syllabus. It is not presented as an add-on to teaching and learning but as a tool to help teachers to integrate ICT in teaching and learning. The Framework provides a guide to teachers for embedding ICT in curriculum and assessment across curriculum subjects. It is an enabling Framework.***

The NCCA also published a consultative document in December 2004, "Curriculum Assessment and ICT in the Irish Context: A Discussion Paper". This paper devoted an entire chapter to discussing emergent literacy definitions culminating in a vision of ICT literacy:

> ***All students will leave school as capable independent learners, able to use ICT confidently, creatively, and productively, able to communicate effectively, able to work collaboratively, and to critically evaluate, manage and use information.***

(NCCA, 2004 p 29)

The NCCA has articulated a clear role for ICT within the primary curriculum and is actively developing a series of exemplars to showcase how teachers are embedding ICT into their classroom teaching. Their ICT framework document builds on the work of their 2004 consultative document to provide teachers with ideas and support on how to embed ICT across the curriculum.

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[2] ACTION stands for **A**ssessment, **C**urriculum and **T**eaching **I**nnovation on the **N**et.

Definition of Digital Literacy in primary school contexts

In this review we began by exploring the notion of literacy and we provided a brief historical perspective on the connections between literacy and power. We also showed how literacy is connected with communication and argued for a situated conception of literacy as beyond a stated set of skills. In our view, literacy is associated with the practices of society and it is best understood in reference to the shared meaning associated with these practices. Therefore we can describe the "world" of literacies rather than literacy.

We also provided a brief review of the emergence of the concept of computer literacy in the last 30 years. The early emphasis was on the science of computing and computer competence was associated with programming and technology. With the evolution of everyday digital technologies a new emphasis on practical application and the functional advantages of technology emerged. The concept of digital literacy was introduced and two definitions were tabled: Gilster (1997) and Martin (2006).

We then considered the connection between digital literacy and print literacy and a number of other research studies were discussed. The connection between these literacies is more complex that might first be expected and of particular note was the way people used traditional (print) literacies in new technology contexts.

We presented a model of learning based on the Inquiry Cycle and demonstrated how this view of learning is espoused in the Irish Primary Curriculum and in a number of publications dealing with ICT and learning and teaching in Irish school contexts.

We are now in a position to propose our definition of digital literacy appropriate for Irish primary school contexts. Taking into account the previous discussion, the definition will have the following characteristics:

- It will be based on a **situated view of literacy** and therefore it will be context specific - in this research the appropriate context is the primary school classroom.

- It will be based on the **practices associated with primary school classrooms** - in this case teaching and learning practices.
- Literacy is **shared** rather than individual.
- Our model of learning is based on the **Inquiry Cycle.**
- Our model of teaching involves structuring **activities** to support Inquiry Cycle learning/

We therefore propose the following definition of digital literacy:

> ***Digital literacy in primary schools involves pupils and teachers using digital technology to enable, sustain and enrich all aspects of the inquiry cycle of learning as: ask, investigate, create, discuss and reflect.***

In this definition we suggest that digital literacy involves pupils and teachers using technology for a purpose and we are clear that the purpose relates to the inquiry cycle of learning.

The definition suggests three ways in which digital media practices can enhance the Inquiry Cycle:

- Firstly, practices can **enable** the cycle by offering new entry points such as taking pictures for investigating or facilitating discussion through on-line connection;
- Secondly, practices can **sustain** the cycle through expansion as in when new questions arise from reflection facilitated by reviewing creative outputs such as a photo story or web site;

- And thirdly, digital media practices can **enrich** the Inquiry Cycle by facilitating different modes of experience and engagement such as visual (the fine detail of the flower), aural enrichment (the sound of the wind), narrative, music, text and symbols.

Method

The goal of this research was to develop a framework for conceptualising digital literacy in the context of Irish primary education and to investigate digital media practices in the classroom. To achieve this we sought to establish a new contextual definition for digital literacy and a means to describe the current practices in schools with reference to this definition.

In the previous section we provided a theoretical overview leading to a new definition of digital literacy. A framework may be regarded as an extension of a definition into practice. It is a conceptual tool – a way of thinking about the consequences and application of ideas.

There is a need for a useful framework to help teachers, policy makers and other educators understand the connection between digital literacy and the learning and teaching practices in the classroom.

The starting point for such a framework is to reference the practices and activities that take place in the classroom. Obviously, the goal of classroom activity is to bring about learning and as such, we grounded our digital literacy framework in a conception of learning centered on the Inquiry Cycle.

The initial framework was devised as a series of components and organised in the form of a checklist to be used by the researchers to rate classroom activities. The intent was for this *Component Checklist* to form the basis of the eventual digital literacy framework. The component checklist was devised specifically for this research and was subject to review and improvement throughout the lifespan of the project. The checklist facilitated observers to classify classroom activities along ten parameters based on the theoretical models discussed above.

Table (a) Elements of the *Component Checklist*

Ask
Investigate
Create
Collaborate
Reflect/Express
Participation (depth)
Participation (scope)
Print literacy
Media ecology
Use of digital media

Tables (I) to (XVI) presented in Appendix 2 demonstrate how the component classification system captured and rated the activities in project classrooms. To illustrate this process we present the five classifications for the component *Ask* in Table (b) below.

Table (b) Classifications for the component *Ask*

Significant questions e.g. recognising both the affordances and the constraints and/or the nature of the mediation of the topic
Inquiries tend to be more purposeful
Inquiries tend to be somewhat limited in scope
Some inquiry but questions are disconnected from one another, from other aspects of learning and from lived experience
Little evidence of questioning or inquiry

In this way observers were able to describe classroom activities in terms of learning as inquiry and to provide additional data on student participation (in terms of depth and numbers), the integration of print literacy, the use of media and artefacts (media ecology) and finally, a rating for digital literacy.

The structure of the checklist also served to focus on the specific questions of this research namely the nature of student engagement and participation, the degree to which such activities foster traditional (print) literacy skills, and the adequacy of the newly developed framework as a tool to describe digital literacy in classroom contexts.

Participating Schools

The school visits and observations took place during the period Monday 18th February to Friday 11th of April, 2008.

The four schools involved in this research were:

School 1 - Scoil San Seamus CBS Primary, Basin Lane, James Street, Dublin 8, Principal Mr Joe Tulie

School 2 - Mater Dei National School, Basin Lane, James Street, Dublin 8, Principal Sr. Rita Wynne

School 3 - Presentation Primary School, Warrenmount, Dublin 8, Principal Eileen O'Connell (now Margaret Ryan)

School 4 - Francis Street CBS, Francis Street, Dublin 8, Principal Fiona Collins

Prior to the study all of the participating teachers and school principals were invited to a meeting with the research team. At this meeting the process of investigation was explained and teachers were invited to contribute as fully as possible to the research process. It is the view of the Research Team and the Steering Group that the role of teachers in this research was more akin to co-investigators rather than subjects under

study. We wish to acknowledge that we received excellent co-operation from all of the participating schools and teachers.

We asked teachers to select an appropriate activity for researchers to observe during the two school visits. We suggested that teachers devise an appropriate project. It is important to note researchers did not prescribe the activities or the media to be used – the choice of project was left entirely up to the teacher. For the purposes of this research, each class was classified as a 'case'.

The research team was divided into pairs of 'observers', each pair being responsible for one case. The research observers were: Leo Casey, Chip Bruce and Abi Reynolds from National College of Ireland, Gerry Shiel and Laura Coffey from the Educational Research Centre and Clifford Brown from the Digital Hub Development Agency.

Research Cases

Each school was asked to put forward two classes to participate in this research, one class at grade 3 and one at grade 4. In Presentation Primary School, 4th Class is split into two groups and the school requested both be involved. We therefore studied eight classes which became eight cases.

The eight cases are as follows:

Case 1 'Bills New Frock' Fourth Class, Scoil San Seamus CBS

Case 2 'Vikings' Fourth Class, Mater Dei NS

Case 3 'The Digital Dog' Fourth Class, Francis St CBS

Case 4 'How to Make a Banana Split' Third Class, Scoil San Seamus CBS

Case 5 'The Three Little Pigs' Third Class, Presentation Primary School

Case 6 'Fractions' Third Class, Francis St CBS

Case 7 'Memories' Fourth Class (1) & (2), Presentation Primary School

Case 8 'St Patrick', Mater Dei National School

Data Collection and Analysis

Sample and Cases

Our unit of analysis was a class project carried out by a specific teacher; for example, a typical case involved a project based on the creation of a clay animation figures on the Vikings.

Data were collected from a number of sources and using a range of methods including:

- Classroom observation using the Component Checklist
- Interviews with school principals and teachers
- Collection of digital artefacts of student project outcomes
- Photos, audio recordings and contemporaneous notes
- All of the researchers collaborated using a protected research support web site that facilitated the extensive input of data and component ratings.

Researchers were required to conduct two class observations per case and interview the class teacher before and during the project.

The timeline below indicates the sequencing of interviews and observations:

----------X1------- O1 ----------class---project---------- O2----X2----------➔

X1 first teacher interview X2 second teacher interview (optional)

O1 first class observation O2 second class observation

In addition, interviews were conducted with the school principals or where appropriate, ICT coordinating teachers.

Component Checklists

A special secure research web site was constructed to facilitate the input of data by each of the observers following the school visits. Researchers observed in pairs and each individual researcher was required to independently classify the activities using

the Component Checklist. Classifications were posted to the research site after each visit. At the end of the data collection process observers compared their individual ratings with those of their counterparts. If there was a difference in classification this was discussed and an agreed classification was arrived at. The Component Checklist Summary Tables presented in Appendix 2 are those agreed between each pair of observers.

This strategy of initial independent classification and later comparison served to reduce the subjectivity of the process. The web site also facilitated a common shared interpretation of the checklist classifications among the different observers. Improvements were made to some of the component checklist descriptors in response to feedback from observers following the first field visits.

Inquiry Cycle Activity Summary

The second stage of analysis involved the development of an Inquiry Cycle Activity Summary (ICAS) for each case. The ICAS is derived from an interpretation of the data and it represents the researchers' view of the relationship between class activities and the dimensions of the Inquiry Cycle. The ICAS tables are intended as broad summaries and are based on the span of the project rather than an individual class.

It is important to note that the concept of the ICAS was arrived at as a result of the research process. It represents the combined view of the research team as the most appropriate framework to consider the project activities and the relationship between these activities and the Inquiry Cycle.

The Inquiry Cycle Activity Summary suggests that the project (or case) be presented as the connection between classroom activities and elements of the Inquiry Cycle – Ask, Investigate, Create, Discuss and Reflect - Table (c) below shows the template used to organise this finding.

In this way the full span of class activities was considered with respect to each of the Inquiry Cycle dimensions. This structure represents a suggested framework within which digital and print literacies may be considered within primary class contexts. We also present a blank version of the Inquiry Cycle Activity Summary which may be used as a planning tool for teachers (see Appendix 1).

Table (c) Inquiry Cycle Activity Summary

How is…	Ask	Investigate	Create	Communicate	Reflect
facilitated by activity centered on:					
Teacher?					
Group work?					
Print media?					
Digital media?					
Other materials?					

Findings

How the findings are presented

Researchers worked in pairs to gather data and to agree on an overall rating for each class project that was observed. The cases presented in the findings of this report are compiled from observations, interviews with the class teacher and interviews with the school principal. Insights from digital artefacts and other materials were also taken into account.

There are four sections to each case:

(1) Case Description

(2) Observer Component Checklists Summaries (see Appendix 2)

(3) Digital Literacy Classification (see Appendix 3)

(4) Inquiry Cycle Activity Summary

Case 1 'Bill's New Frock'

Scoil San Seamus CBS, 4th Class Boys

Scoil San Seamus CBS is an inner city urban school and has been classified by the Department of Education as DEIS Band One school (in receipt of significant extra educational support). It is an all-boys school with 140 pupils in 2nd to 6th class. Over 25% of the school population are newcomer pupils. The school has extra staffing for pupils with special needs and a language support teacher for pupils whose first language in not English. The principal is a strong advocate of the use of technology in teaching but feels that the school is under resourced in terms of hardware and technical support.

This class comprises 23 boys and their project was to make digital videos of pupil interviews on questions arising from a novel they read in class called *Bills New Frock*.

Activity

After some spelling exercises the teacher organised a discussion on girls and why sometimes boys don't like them. The pupils worked in pairs and discussed 'things they find annoying' – they were asked to rate these on a scale of one to five. They then were asked to think about what they find annoying about girls; examples such as girls' obsession with their appearance and "they keep talking all the time" were discussed. This exercise became the preparation for pupils recording their opinions to camera. While recording, they adopted roles as interviewer and interviewee. The teacher arranged for a pupil from 6th class to act as the camera operator and the class used cue cards to assist in the filming.

The aim of the project was to help the boys develop thinking skills and oral fluency and give them confidence to speak to camera. The pupils had to think of suitable questions to ask and answers to give and prepare their interviews prior to filming. They watched the videos in school and the boys were very proud of what they had achieved.

- The **Observer Component Checklist Summaries** for Case 1 'Bill's New Frock' are presented in **Appendix 2** of this report as Table (i) and Table (ii)
- The **Digital Literacy** Classification is presented in **Appendix 3** of this report

Case 1 'Bill's New Frock'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Sets up question: What do you find annoying?
Group work	Pupils discuss examples from their own experience
Print media	The novel provides a story as backdrop to the inquiry
Digital media	
Other materials	

Case 1 'Bill's New Frock'

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Organises and assigns roles (interviewer and interviewee)
Group work	Pupils discuss consequences
Print media	
Digital media	Pupils prepare for video recording
Other materials	

Create	
Activity centered on…	**Description**
Teacher	Organises for older pupil to operate video camera
Group work	Pupils work in pairs – interviewer and interviewee
Print media	Pupils write and read cue cards
Digital media	Interviews are recorded
Other materials	

Case 1 'Bill's New Frock'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Organises video playback on computer
Group work	
Print media	
Digital media	Pupils review videos
Other materials	

Reflect	
Activity centered on…	**Description**
Teacher	Elicits reports from groups
Group work	Pupils report on the experience
Print media	Further reading from the novel with new insights
Digital media	
Other materials	

Case 2 'The Vikings'

Mater Dei National School, 4th Class Girls

Mater Dei National School is an inner city school and has been classified by the Department of Education and Science as DEIS Band One. The school has 250 pupils. Boys are not catered for in this school after 1st class (the move to another school) - there are only girls from 2nd to 6th classes. The school has one computer in each class room and also has a computer room. Literacy is a concern for the school and the principal feels that the use of computers is very beneficial for literacy skills development. She reports that there is a good culture of technology use in the school thanks to the school's involvement in the Digital Hub's Learning Initiative.

Activity

This project involved 4th class girls who were learning about the Vikings as part of their History lessons. The aim of the project was to make an animated movie about a day in the life of a group of Vikings arriving to settle in Ireland. They began by making a storyboard for the movie wherein they planned the scenes, dialogue and actions to take place. They then designed and constructed miniature sets and small characters for the movie using modelling clay for the characters and other art materials for the sets. The movie was made by taking a series of digital still images with small adjustments made between each still to create an animated effect. The scenes were subsequently edited and text, visual effects, music and dialogue were added through the use of dedicated animation software (Frames).

The teacher divided the class into groups and each group prepared a scene for the movie. This group activity involved writing, drawing and discussion on how the ideas of each group could be used. Each member of the group was assigned a specific role - the group roles were: leader, time-keeper, recorder and reporter. The teacher prepared for the group work by revising previous lessons on how to work in groups and the tasks for each role as members of the group.

Groups constructed the sets during their art classes and everyone was given an opportunity to use the digital camera when the scenes were being recorded. The girls

had to use their creativity and imaginations to plan, construct, shoot and edit the movie. They used the knowledge learned in History class to visualise and interpret the difficulties Viking settlers might have faced. The project integrated many aspects of the school curriculum - history, language (written and oral), art, music and drama. The girls also learned about the processes involved in film making including skills in using a camera to frame shots, animation, sound editing and image editing.

- The **Observer Component Checklist Summaries** for Case 2 'The Vikings' are presented in **Appendix 2** of this report as Table (iii) and Table (iv)
- The **Digital Literacy Classification** is presented in **Appendix 3** of this report

Case 2 'The Vikings'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Links project to class work in History
Group work	Pupils plan the story scenes in groups
Print media	The storyboard planning template is used
Digital media	
Other materials	

Case 2 'The Vikings',

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Organises and assigns roles (leader, time-keeper, recorder and reporter)
Group work	Pupils collaborate to create sets and characters
Print media	Pupils document the narrative
Digital media	Pupils prepare for photo taking
Other materials	Art materials – modelling clay, cardboard, paint

Create	
Activity centered on…	**Description**
Teacher	Organises pupils to use camera and move characters
Group work	Pupils use camera and laptop to create animation in groups
Print media	Storyboard used as reference
Digital media	Pupils edit animation and add narrative
Other materials	

Case 2 'The Vikings'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Organises showing of animation
Group work	
Print media	
Digital media	Pupils review animation
Other materials	

Reflect	
Activity centered on…	**Description**
Teacher	Elicits responses from pupils
Group work	Pupils report on process and final animation
Print media	Further research about Vikings in Ireland
Digital media	DVD creation
Other materials	

Case 3 'The Digital Dog'

Francis Street CBS, 4th Class Boys

Francis Street CBS is an inner city school and has been classified by the Department of Education and Science as DEIS Band One school. The school has 145 pupils, ranging from 2nd to 6th class, with two special classes. There are 13 teachers.

The Principal reported that the introduction of technology into teaching and learning has enhanced the ethos and the culture of the school. The school is now recognised for its use of the technology in the classroom and has won awards for its innovative approaches. Using digital tools has allowed the school to engage and empower the children, especially those in early years and increase their self-esteem and confidence.

Activity

This was a class project for fourth class boys. During English, the boys had just read The Hundred-Mile-An-Hour Dog. For this project, the boys were broken up into 6 groups and each group was asked to pick a chapter of the book to work with.

The aim of this activity was to create a 'digital story' of the chapter. To do this the boys first used storyboards to create their own stories based on chapters from the book. They then made clay figures to create characters from their story. Once the clay was set, the boys set up figures in 'scenes' which were based on their storyboards. They then took digital photos of each scene and transferred these to the computer. Then using software called Photostory, the boys put together a digital presentation, complete with photos, captions and music.

With the teacher supervising, each group worked independently, undertaking each activity in turn and deciding among themselves which story and character they would use. The children had to use their imagination to make characters, interpret the story, learn about the plot etc. The activity combined art - sketches, colouring, clay figures, collage backdrops - with group work - planning, sharing work, dispute resolution – with use of technology - audio files, editing software, picture software - as well as reading and writing.

- The **Observer Component Checklist Summaries** for Case 3 'The Digital Dog' are presented in **Appendix 2** of this report as Table (v) and Table (vi)
- The **Digital Literacy Classification** is presented in **Appendix 3** of this report

Case 3 'The Digital Dog'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Promotes reflection: "What is your favourite part of the book?"
Group work	Pupils select a chapter, discuss various events from the book, consider elaborations
Print media	The novel provides a story backdrop to the inquiry
Digital media	
Other materials	

Case 3 'The Digital Dog'

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Organises groups to start project
Group work	Discuss and agree on chosen scene and requirements
Print media	Pupils use storyboard planners
Digital media	Pupils prepare for photo taking
Other materials	Pupils use a variety of art materials

Create	
Activity centered on…	**Description**
Teacher	Organises groups to take photos
Group work	Make clay figures from scenes, take pictures
Print media	Add suitable captions
Digital media	Pupils photograph clay figures to produce clay animation, select and edit background music, write on the computer, record narration
Other materials	Clay figures, collages, dioramas

Case 3 'The Digital Dog'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Organise showing of Photo Story on whiteboard
Group work	Negotiate favourite scenes and which characters to include. Choose music together.
Print media	Pupils refer back to the text to check details
Digital media	Pupils review Photo Story movies
Other materials	Pupils share their work on a bulletin board

Reflect	
Activity centered on…	**Description**
Teacher	Elicits responses from groups
Group work	Pupils report on the movie creation - discuss final projects
Print media	Further reading from the novel with new insights
Digital media	Pupils present their digital creations to the class and to visitors, soliciting feedback
Other materials	Displayed in the classroom for visitors to see and for further reflection on what has been learned

Case 4 'Banana Split'

Scoil San Seamus CBS, 4th Class Boys

Scoil San Seamus CBS is an inner city urban school and has been classified by the Department of Education as DEIS Band One school. It is an all-boys school with 140 pupils in 2nd to 6th class. Over 25% of the school population are newcomer pupils. The school has extra staffing for pupils with special needs and a language support teacher for pupils whose first language in not English. The principal is a strong advocate of the use of technology in teaching but feels that the school is under resourced in terms of hardware and technical support.

Activity

This project was carried out by third class boys - 23 boys in the class. It was a short duration project over two weeks and the aim was to develop a slide show on how to make a banana split. To start, the boys discussed what ingredients they would need to make the banana split. The teacher presented the recipe and instructions and reviewed key vocabulary words using cards. She helped them to preview the steps involved to make a banana split. They boys then photographed their work as they made the banana split. They worked in groups to make banana splits and there was much fun in the eating of the finished product.

The class then used Photo Story 3 to make the slide show of the process. They had to order the photos, add text and effects to the images and add background music to the presentation. With the support a language teacher, they engaged in much discussion about suitable music and made a very appropriate selection. The boys made four movies and the following week had a showcase in school of their work. The project helped the boys develop their reading skills through following instructions to create the banana split and there was a lot of work done by them in describing orally how they made the movies. The boys felt they had learned new words and learned how to crop digital images. The use of the digital camera and computer gave the project an added stimulus and the boys enjoyed the practical aspects of making the banana split and the use of the technology to capture their work and tell their story.

- The **Observer Component Checklist Summaries** for Case 4 'Banana Split' are presented **in Appendix 2** of this report as Table (vii) and Table (viii)
- The **Digital Literacy Classification** is presented in **Appendix 3** of this report

Case 4 'Banana Split'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Initiates discussion on deserts and cooking
Group work	Pupils discuss their favourite deserts and discuss steps for making a banana split
Print media	Teacher reviews key vocabulary words on cards and uses large poster-size instructions for recipe based on discussion
Digital media	
Other materials	

Case 4 'Banana Split'

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Organises groups for making banana splits and taking photos of the process
Group work	Pupils collaborate to plan the making of the desert
Print media	Pupils use the poster size recipe
Digital media	Pupils prepare for photo shooting
Other materials	Collection of ingredients for desert

Create	
Activity centered on…	**Description**
Teacher	Directs the groups in the desert creation and assists pupils with Photo Story movie
Group work	Groups make banana splits, take photos and then make Photo Story movies, with support form resource teacher
Print media	Use of the printed recipe
Digital media	Pupils use Photo Story software to create movies about making banana splits
Other materials	Recipe ingredients

Case 4 'Banana Split'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Organises video playback on computers
Group work	Discussion on the process
Print media	
Digital media	Pupils review videos
Other materials	

Reflect	
Activity centered on…	**Description**
Teacher	Elicits reports from groups
Group work	Pupils report on the tasting of the deserts
Print media	Pupils write reflections
Digital media	
Other materials	

Case 5 'The Three Little Pigs'

Presentation Convent Primary School, 3rd Class Girls

Presentation Convent Primary School is a DEIS Band One primary school in the inner city of Dublin. Approximately 320 pupils attend the school with pupils from 29 different countries speaking 28 different languages. As a result, there are 4 dedicated language teachers. The school serves boys and girls up to and including first class, and girls-only from second to sixth classes. The school has a teacher who works full time as ICT co-ordinator; she maintains the school's hardware and software. She works co-operatively with class teachers in their classrooms to support them with project development and implementation as well as advancing literacy and numeracy through ICTs. She also supports the school's network. The school has recently purchased 30 laptops, which are used in the computer room and in classrooms. She allocates one day per week to technical maintenance. According to the co-ordinator, ICTs are integrated across the curriculum, though their efforts are not yet reflected in improved standardised test scores.

Activity

The Three Little Pigs project was carried out with 3rd class. The aim of this project was to develop the literacy skills of the girls through the creation of an animated movie with a fairy tale as the theme.

The completed production tells the story of the Three Little Pigs and their attempts to build a house strong enough to protect them from the big bad wolf. The animation was made through storyboarding the movie into 12 scenes. The class was divided into groups and each group had to build a background for the scenes to be used in the taking of the photographs. Digital still cameras mounted on tripods were used for the photo shooting and then the images were downloaded to laptops for editing. Using software called Frames the class added titles, transitions and recorded the dialogue. The groups had to script the narrative and they delivered it orally with dramatic effect.

There was a need for collaboration and decision making in the groups to ensure they completed the movie successfully. The girls were familiar with animations such as *Wallace and Gromit* and had a good idea of what they wanted to achieve.

- The **Observer Component Checklist Summaries** for Case 5 'The Three Little Pigs' are presented in **Appendix 2** of this report as Table (ix) and Table (x)
- The **Digital Literacy Classification** is presented in **Appendix 3** of this report

Case 5 'The Three Little Pigs'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Teacher asks pupils about fairy tales they know
Group work	Pupils discuss what fairy tales they will animate
Print media	Books of fairy tales
Digital media	
Other materials	

Case 5 'The Three Little Pigs'

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Organises and assigns pupils to groups
Group work	Pupils plan the animations
Print media	Printed planning storyboards
Digital media	Pupils prepare for photo taking
Other materials	Art materials for set and character creation

Create	
Activity centered on…	**Description**
Teacher	Organises groups for photo shooting and character movement
Group work	Pupils create characters and sets
Print media	
Digital media	Each scene is shot for animation made using Frames
Other materials	

Case 5 'The Three Little Pigs'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Organises animations for playback on computer
Group work	Pupils comment on each animated movie
Print media	Pupils read other fairy tales
Digital media	Pupils review animations
Other materials	

Reflect	
Activity centered on…	**Description**
Teacher	Teacher discusses the project with pupils
Group work	Pupils write reflections
Print media	Further reading of fairy tales
Digital media	
Other materials	

Case 6 'Fractions'

Francis Street CBS, 3rd Class Mixed

Francis Street CBS is an inner city school and has been classified by the Department of Education and Science as DEIS Band One school. The school has 145 pupils, ranging from 2nd to 6th class, with two special classes. There are 13 teachers.

The Principal reported that the introduction of technology into teaching and learning has enhanced the ethos and the culture of the school. The school is now recognised for its use of the technology in the classroom and has won awards for its innovative approaches. Using digital tools has allowed the school to engage and empower the children, especially those in early years and increase their self-esteem and confidence.

Activity

This observation took place during a Mathematics class, where the teacher was using an interactive whiteboard to teach fractions in a revision class. The teacher used the interactive whiteboard to explain fractions, the equivalence of shape, set and number. The interactive shapes on the whiteboard provided a visual representation of concepts such as division and fractions (a pie divided in 2 and then divided again). Pupils were encouraged to think about the outcomes prior to seeing them on the screen. The teacher also provided examples of fractions as applied to money – pupils were invited to think about going to the shops with 50c to spend and to consider if they spend 25c or half of that, how much would they have left?

The class was seated in semicircle in front of the whiteboard – pupils either raised their hand to respond to questions or in some instances, individual pupils were asked to respond by the teacher.

This case was not based on a student project or activities – it was a revision class, there was no group work and pupil engagement was limited to answering questions and observing the teacher instruction using the interactive whiteboard. The Component Checklist Summaries for this case demonstrate the contrast in ratings between teacher instruction and pupil-led inquiry. The observers noted that this was

a revision class and as such, somewhat of an outlier in comparison to the other cases in this report.

- The **Observer Component Checklist Summaries** for Case 6 'Fractions' are presented in **Appendix 2** of this report as Table (xi) and Table (xii)
- The **Digital Literacy Classification** is presented in **Appendix 3** of this report

Case 6 'Fractions'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Sets up question "what are fractions?"
Group work	Pupils give examples from their own experience
Print media	The interactive whiteboard software on fractions
Digital media	Interactive whiteboard
Other materials	

Case 6 'Fractions'

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Leads the lesson using questions and illustrations
Group work	Pupils respond to questions on fractions
Print media	Maths books used in class
Digital media	Pupils see fractions on interactive whiteboard
Other materials	

Create	
Activity centered on…	**Description**
Teacher	
Group work	
Print media	
Digital media	
Other materials	

Case 6 'Fractions'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Shows illustrations for discussion and sets activities for pupils
Group work	Pupils work on activities
Print media	Maths books and copies
Digital media	Interactive whiteboard
Other materials	

Reflect	
Activity centered on…	**Description**
Teacher	Elicits answers from pupils and discusses the outcomes, considers other contexts
Group work	
Print media	
Digital media	
Other materials	

Case 7 'Memories'

Presentation Convent Primary School, Two 4th Classes

Presentation Convent Primary School is a DEIS Band One primary school in the inner city of Dublin. Approximately 320 pupils attend the school from 29 different countries speaking 28 different languages. As a result, there are 4 dedicated language teachers. The school serves boys and girls up to and including First class, and girls-only from Second to Sixth classes. The school has a teacher who works full time as ICT coordinator for the school and she maintains the school's hardware and works co-operatively with class teachers in their classrooms to support them with project development and implementation as well as advancing literacy and numeracy through ICTs. She also supports the school's network. The school has recently purchased 30 laptops, which are used in the computer room and in classrooms. She allocates one day per week to technical maintenance. According to the co-ordinator, ICTs are integrated across the curriculum, though their efforts are not yet reflected in improved standardised test scores.

Activity

There are two fourth classes in the school with 15 girls in each class. Both classes carried out the same project under the direction of the class teacher and the ICT coordinator of the school. The aim of the project was to develop short movies about the earliest memories the girls had. There was much discussion about the topic with many personal stories recounted.

The girls were asked to bring in photos of themselves growing up from family albums. Not everyone was able to do this so three groups were established, and each one approached the project differently. Those who had photos used a scanner to create digital images for their project. The second group took digital cameras home and took images of their families for their projects. The third group used teddy bears and brought them to various locations in the school where they photographed them. Once each group had their images on laptop computers they were asked to write some sentences about each image and then select music form the computer to use

with their story. The classes were shown how to use Photo Story software to add effects and text to their images and then they added the selected music. The groups made a total of 19 movies and there are many varied stories and memories captured in them. The teachers felt the girls learned a lot from the project and that the focus was very much on literacy development. They also felt that they were learning digital skills incidentally through the work.

- The **Observer Component Checklist Summaries** for Case 7 'Memories' are presented in **Appendix 2** of this report as Table (xiii) and Table (xiv)
- The **Digital Literacy Classification** is presented in **Appendix 3** of this report

Case 7 'Memories'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Asks the question: "what are your earliest memories?"
Group work	Pupils discuss examples from their own experience
Print media	The pupils write about memorable events in their lives
Digital media	
Other materials	

Case 7 'Memories'

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Organises groups and assigns roles within groups
Group work	Pupils discuss their project and plan the movies
Print media	Storyboard templates are used to plan
Digital media	Pupils prepare for photo taking
Other materials	

Create	
Activity centered on…	**Description**
Teacher	Organises groups to take photos and assists with using the software
Group work	Pupils take photos and edit movies on laptops
Print media	
Digital media	Pupil use digital cameras and laptops
Other materials	

Case 7 'Memories'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Organises movie show and tell class
Group work	
Print media	Pupils write about their movie
Digital media	Pupils review videos of other groups
Other materials	

Reflect	
Activity centered on…	**Description**
Teacher	Elicits reports from groups
Group work	Pupils interview parents and grandparents out their memories
Print media	Reading of documents pupils brought from home
Digital media	
Other materials	

Case 8 'Saint Patrick'

Mater Dei National School, Special Needs Class

Mater Dei National School is an inner city school that has been classified by the Department of Education and Science as DEIS Band One. The school has 250 pupils. Boys are not catered for in this school after 1st class and there are girls only in 2nd to 6th classes. The school has one computer in each class room and also has a computer room. Literacy is a concern for the school and the principal feels that the use of computers is very beneficial for literacy skills development. She says there is a culture of technology use in the school thanks to the school's involvement in the Digital Hub's Learning Initiative.

Activity

This project involved a special-needs English class made up of 5 pupils from 4th class, one from 5th and one from 6th class. The girls were learning about Saint Patrick and were using books provided by the teacher to find out about his life. The aim of the project was to make a Podcast about Saint Patrick in Ireland. This took the form of a radio show and the girls played the roles of reporters at the Saint Patrick's Day Parade in Dublin, interviewing spectators and then St. Patrick himself. The project process involved learning about St. Patrick's life and then planning a radio show schedule. The pupils scripted questions for the interviews, selected introductory music and sound effects for the show, made the recordings using a microphone and computer, edited and added the clips and then outputted the show as an MP3 file for sharing.

The teacher organised the group and questioned them about St Patrick before introducing the project and the technology to be used. Pupils worked in groups to write about the project, prepare questions for the interviews and research the life of Patrick. The group multitasked in the sessions and took turns trying the podcasting software to learn how to use it. All pupils participated in the recording of the radio show and had to role play as interviewers or respondents. The project combined reading, writing and drama in a collaborative setting. The use of podcasting software in the project was new for all pupils and they all agreed that it was very engaging project.

- The **Observer Component Checklist Summaries** for Case 8 'St Patrick are presented in **Appendix 2** of this report as Table (xv) and Table (xvi)
- The **Digital Literacy Classification** is presented in **Appendix 3** of this report

Case 8 'Saint Patrick'

Inquiry Cycle Activity Summary

Ask	
Activity centered on…	**Description**
Teacher	Asks the question: "What did you do on St. Patrick's Day?"
Group work	Pupils recount their activity on the day
Print media	Books about the story of St. Patrick are used
Digital media	Pupils introduced to recording hardware
Other materials	

Case 8 'Saint Patrick'

Inquiry Cycle Activity Summary (continued)

Investigate	
Activity centered on…	**Description**
Teacher	Organises groups and assigns roles for making the podcast (interviewer and interviewee)
Group work	Pupils plan the podcast: music, sound effects and script for show
Print media	Podcast planning templates used for scripting
Digital media	Pupils prepare for audio recording
Other materials	

Create	
Activity centered on…	**Description**
Teacher	Organises groups to make recordings and others to write about St. Patrick
Group work	Pupils record podcast
Print media	
Digital media	Microphones and podcasting software used
Other materials	

Case 8 'Saint Patrick'

Inquiry Cycle Activity Summary (continued)

Discuss	
Activity centered on…	**Description**
Teacher	Organises podcast playback
Group work	Pupils discuss the podcast
Print media	Pupils write about St. Patrick
Digital media	Pupils review podcast
Other materials	

Reflect	
Activity centered on…	**Description**
Teacher	Elicits views from groups on making podcasts
Group work	Pupils reflect on what they liked about making podcasts
Print media	Further reading about life of St. Patrick
Digital media	
Other materials	

Discussion and Conclusions

Addressing the research questions

We suggested at the start of this report that the fundamental question that needs to be addressed through research is: "how do digital media practices relate to teaching and learning practices in the Irish primary school"? We indicated that when we use the term 'practices' we mean the goals and activities that take place in the classroom and in general, these are directed toward the achievement of learning outcomes. In this research we gave equal emphasis to both sides of this relationship – we looked at the constraints and affordances of digital media and we looked at the nature of learning and teaching practices.

We argued that the best way to consider digital literacy is to adopt the situated and social practice view of what literacy really means. In this approach literacy is seen as embedded in practice and less emphasis is placed on literacy as a set of skills. To illustrate this point consider the following example taken from Case 4 Banana Split – where the practices in the classroom centered on the learning task of how to make a banana split. We observed several literacies embedded in this task – the teacher had provided a list of steps on a poster in advance of the activity and pupils were provided with an opportunity to memorise and write down these steps. During the group work (making the banana split) they could refer to the notes they had previously written and they were also asked to write a report as they completed the task. The pupils were also provided with cameras to take pictures and they knew that in the future these pictures would be used to create a picture story. However, during the banana-split-making activity the cameras were just part of the process – working in groups one pupil peeled the banana, one poured the cream, one wrote down the steps and one took the pictures. This is an example of embedded literacy – there was no sense that the digital camera was any more or less important than the banana! Taking pictures was part of the practice it was not the sole reason for the practice. The pupils were not overly concerned with the technical aspects of the digital camera but they did appreciate that they were documenting for the future.

The keyword here is 'embedded' – we found that teachers organised activities that supported learning by inquiry and that the use of digital media was integrated into

this process. Thus the Inquiry Cycle model of learning, discussed in this report, is an appropriate framework within which to consider the impact of new digital media practices. The questions we consider below arise from these conceptions of digital literacy and learning; they were tabled at the beginning of this report and are reconsidered here in light of the findings of this research.

(i) How should we define digital literacy?

The theoretical review pointed to a conception of digital literacy as situated practice. The following context specific definition of digital literacy was proposed:

> ***Digital literacy in primary schools involves pupils and teachers using digital technology to enable, sustain and enrich all aspects of the inquiry cycle of learning as: ask, investigate, create, discuss and reflect.***

How are teachers using digital technologies in the classroom?

Our investigation of the current practices in the four schools observed for this research are summarised as follows:

- The use of digital technology was generally observed as embedded in structured learning activities directed at curriculum learning outcomes rather than as an end in itself.
- Teachers use tools such as the digital camera, audio devices and class computers to engage pupils in different roles and to facilitate inquiry learning and group work.
- Digital outputs such as photo-stories, podcasts and video served as project goals and were usually the culmination of a broad range of preparation and production activities.

How can we relate digital media to instructional practice?

The classroom projects demonstrate how the teachers and pupils worked together to produce digital artefacts. Through this process the development of digital literacy and learning are seen to be take place in tandem. Many of the project themes were

founded within the pedagogy of child centered learning and utilised the elements of the Inquiry Cycle to allow the pupils to engage collaboratively in the activities.

It is important to state that the observers noticed that the notion of creating a digital media output (animation, Photo Story etc.) served as a stimulus within the early preparatory written work and engaged the pupils at a level that may not have been evident had the projects only involved paper based outputs.

Within the preparatory and production lessons we found that the communications of the pupils were purposeful and showed high levels of participation. Many of the projects involved the pupils actively engaged in inquiry using objects, text and digital tools.

The **Inquiry Cycle Activity Summary,** for which a full template is provided in Appendix 1, is a key outcome of our work. A condensed version was introduced earlier as Table (C) and is reproduced below for convenience.

Table (c) Inquiry Cycle Activity Summary

How is…	**Ask**	**Investigate**	**Create**	**Communicate**	**Reflect**
facilitated by activity centered on:					
Teacher?					
Group work?					
Print media?					
Digital media?					
Other materials?					

A related question is how to measure or classify digital literacy in classroom contexts; Table (d) below suggests a progression scale. This scale works in a similar manner to the Component Checklist presented earlier. The table is useful in assessing the extent to which participation and engagement leads to meaningful learning – it could be argued that the use of digital media promotes engagement and participation but this in itself may not be sufficient for academic uplift. The table provides a useful reference to ensure progression toward more meaningful learning.

At the end of the research observers were asked to use this scale to rate the overall levels of digital literacy observed in the 8 cases. Appendix 3 presents these ratings for each of the cases.

The levels relate directly to the definition that is presented above. At the lowest level there are no digital media practices in use. This is essentially a null classification and without additional evidence one cannot determine whether non-use is as a result of choice or lack of resources, skills or opportunity.

The next level up sees digital media practices directed at learning the technical and operational skills. This is really the 'getting to know' stage that we are all familiar with when we begin to use a piece of software or technology for the first time.

One level up from this is 'usage'. At this level using digital media is seen as the objective rather than a part of a process. In this mode we make a recording for the sake of making a recording.

At the next level digital media practices enable and sustain inquiry learning. This is perhaps, the immediate ideal for primary classroom practices contexts. The emphasis is on experience and task and digital media are a means rather than the goal of learning.

At the highest level we suggest digital media practices as transforming and changing the nature of inquiry. Here media practices extend the reach of the classroom and open up new forms of engagement and making meaning, including novel uses of technologies, connections with the community beyond the school, and critical analysis.

Table (d) Digital Literacy Classification

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

How can we compare and relate digital literacy to print literacy?

Reading and writing activities were frequently integrated into the planning and content components of digital productions. In some cases, teachers reviewed basic reading skills (e.g., identifying key words, reading sentences in a set of instructions). In others, the focus was on constructing digital content in response to books already read. In still others, pupils composed cue cards in making a film added text captions to digital photographs.

A key element of the projects was the blending of print literacy teaching strategies with the use of digital tools. In the case "Bills New Frock" there was animated group discussion on a book-based topic that later dovetailed to video interviews. Likewise in the case "The Vikings" the girls used storyboarding techniques to plan animation scenes and action to take place.

Limitations of this study

Within the constraints of the study, it was not possible to examine in depth the effects of digital literacy activities on pupils' general reading development. The projects described here represent a snapshot of the activities in which the pupils in the participating schools engage, and a longer study would be necessary to identify

specific effects of digital literacy activities on literacy achievement, or to investigate the long-term effects of these activities on subsequent learning and school success.

We worked with only four schools, chosen both because they were disadvantaged and because we knew there some digital literacy practices in place. It is clear that we must be very cautious in generalising from these results to all primary schools. However, based on work that both we and others have done, it is reasonable to conclude that ordinary schools are capable of using digital media productively and that teachers with modest support can significantly enhance learning in the classroom, even in low-resource circumstances.

This study involved data from teacher and school principal interviews, classroom observations and digital artefacts – in this research we did not seek the views of parents nor did we examine the use of media in the home setting. Future studies would need to incorporate these variables for a more complete analysis of the learning dynamic.

This research facilitated the development of new tools to support pedagogy in primary schools – namely the Observer Component Checklist and the Inquiry Cycle Activity Summary. We proposed a new definition of digital literacy appropriate for primary schools and a Digital Literacy Classification (Table d). The scope of this research did not extend to investigate how these new tools will be implemented at class, subject or school levels – there are many practical challenges to be addressed and no doubt these models will evolve over time.

Discussion and Recommendations

Digital media practices engage, sustain and enrich inquiry learning in primary schools.

The real challenges and opportunities arising from new technology are pedagogical and not necessarily technical. As digital technologies evolve - the trend is for simpler, more intuitive devices (e.g. digital cameras) and the barrier of technical skills is diminished - there are myriad opportunities to harness digital technologies for learning. However, adequate support structures for teachers will be required so that effective practices can be developed and shared. Today we require our primary schools to provide a rich learning environment for children of all backgrounds and

abilities and now more than ever we potentially have the tools and practices to make this a reality.

We have stated that the projects had digital media outputs but we note that the schools were limited in the amount of digital resources at their disposal. This placed pressure on the pupils and teachers in terms of access to the technologies and the timeframes to complete their projects. Levels of engagement and interaction would be greater if the classes were better resourced. For projects to be described as 'transformational' in terms of digital literacy greater access to resources and support for professional development of teachers will be required.

Several specific recommendations arise from the findings of this research:

(1) Digital literacies should be considered as embedded in the pedagogic practices of primary school classrooms. As such, when we seek to nurture and develop specific digital skills in pupils we should do so through inquiry learning activities that act toward broader curriculum goals.

(2) Teacher pre-service training and professional development in relation to the use of digital media in the classroom should centre on pedagogic rather than technical competences. We argue that there is little value in emphasising digital usage as an end in itself and suggest that the emphasis should be placed on instructional strategies that harness digital technologies for learning outcomes. We have provided an Inquiry Cycle Activity Summary template to support this process (see Appendix 1). Use of these checklists ensures that the focus can be on meaningful learning rather than just class participation.

(3) Project learning, group work, field trips, creative expression and many other teaching strategies that foster inquiry learning are given new impetus, vitality and effectiveness through the integration of digital media in these strategies. In this regard, we observed a variety of digital tools in use in primary classrooms: digital cameras, video cameras, audio recording devices, animation, picture story and text captioning software. We recommend that schools consider the pedagogic potential of a broad range of digital technologies alongside the more frequent emphasis on the need for more and better computers and network access.

(4) The relationship between digital literacy and traditional (print) literacy is complex and we suggest that the most useful approach for primary teaching is to consider

how ICT skills and reading and writing skills are closely connected in everyday use. Activities that involve the use of scripts, storyboards, captions and narrative are examples of situations where print literacy skills may be furthered through digital media activities. International research has shown that teachers need to actively structure such opportunities to harness the full learning potential. We recommend that during teacher training and professional development special attention is given to instructional strategies that combine print literacy and digital literacy activities.

(5) We found evidence that digital media promote high levels of engagement and participation in classroom activities. This may be due to the fact that digital outputs such as podcasts, videos, photo stories or animations act as broad project goals capable of providing meaning and purpose to a range of activities. Group work involving different roles (such as photographer and note taker) and capable of involving pupils of different abilities and different learning styles were found to be useful in facilitating high-levels of engagement. We believe that these high levels of engagement, if sustained over time, will lead to improved performance including but not limited to, print literacy scores. We recommend that in teacher pre-service training and professional development special attention is given to instructional strategies that promote inquiry, participation, inclusion, and diverse roles for working in groups.

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Appendix 1 *Inquiry Cycle Activity Summary - A Tool for Planning*

Project Name

Planned Classroom Activities and the Inquiry Cycle

Ask	
Activity centered on…	**Description**
Teacher	
Group work	
Print media	
Digital media	
Other materials	

Investigate	
Activity centered on…	**Description**
Teacher	
Group work	
Print media	
Digital media	
Other materials	

Inquiry Cycle Activity Summary (continued)

Create	
Activity centered on…	**Description**
Teacher	
Group work	
Print media	
Digital media	
Other materials	

Discuss	
Activity centered on…	**Description**
Teacher	
Group work	
Print media	
Digital media	
Other materials	

Inquiry Cycle Activity Summary (continued)

Reflect	
Activity centered on…	**Description**
Teacher	
Group work	
Print media	
Digital media	
Other materials	

Appendix 2 *Component Checklist Summary Tables*

Table (I) Case 1 Bill's New Frock

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
Inquiries tend to be more purposeful[1]	Pupils direct investigations in a structured, problem-solving manner to achieve a goal	Pupils decide on appropriate mix of media to express their outputs	Pupils share their work & learning with one another, they use diverse media to connect with & learn from other	Pupils frame the story/message using media to add meaning
Inquiries tend to be somewhat limited in scope	Investigations occasionally result in further inquiries; they incorporate things they are learning using various media & other aspects of the curriculum	Pupils collate or build a story, edit and select elements[3]	Pupils are focused on the story/message rather then the technical details of the media[4]	Pupils use different voices and perspectives to tell/describe
Some inquiry but questions are disconnected from one another, from other aspects of learning, & from lived experience	Pupils do find information or explore phenomena, -investigations typically only teacher-driven, short-term, & do not lead to further inquiry2	Pupils create: their constructions - typically in just one medium (text or oral) not well-connected to inquiry questions or reflections	Pupils focus on the technical aspects of the creation/collaboration	Pupils narrate, tell, describe in a simple way
Little evidence of questioning or inquiry	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil	Little evidence of meaningful expression

Observer's Comments

1 Opportunities for divergent thinking in activities building up to the interviews
2 Reluctant rating (next one up is too big a jump) - observed investigation with potential for further inquiry - rehearsed interviews but not scripted
3 We saw potential for further use of the media but they were not realised
4 Hands-off approach to the media although rich expression was in evidence not all of the practices encouraged this to fullest extent e.g. formality of video interviews - we note however that the content was authentic

Table (II) Case 1 Bill's New Frock

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school[1]	All pupils absorbed throughout	Texts used as a tool or component of creative planning or expression	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning	Digital media are themselves the object of inquiry
Pupils actively participate in activities that are goal orientated	High levels of enthusiasm and engagement	Texts used to revise/reflect/develop	Decision capacity for 'right tool for the job'	Digital media are used transparently with emphasis on task rather than the tool
Learning in limited to specific task & disconnected from other forms of learning; little evidence of carryover to new problems	Everyone engaged at some point but not always[2]	Texts used to organize and to document the project[3]	Some digital tools, use limited to specific purposes, little integration with other ways of learning [4]	Everyone (pupils & teachers) use media hands-on but in a limited way
Some levels of engagement but patchy and unconnected	Most but not all of class engaged throughout	Texts are in use but little connection between texts and other activities	Digital media not observed but an expectation of future use	Outside experts or teacher required to support use of digital media
Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

1 Nature of content on gender
2 Some pupils were obviously tired or slightly reluctant to engage
3 Texts used: novel, cue cards and posters - no storyboard
4 Formal approach to videoing

Table (III) Case 2 Vikings

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
Inquiries tend to be more purposeful[1]	Pupils direct investigations in a structured, problem-solving manner to achieve a goal	Pupils decide on appropriate mix of media to express their outputs	Pupils share their work & learning with one another, they use diverse media to connect with & learn from other[4]	Pupils frame the story/message using media to add meaning[5]
Inquiries tend to be somewhat limited in scope	Investigations occasionally result in further inquiries; they incorporate things they are learning using various media & other aspects of the curriculum[2]	Pupils collate or build a story, edit and select elements[3]	Pupils are focused on the story/message rather then the technical details of the media	Pupils use different voices and perspectives to tell/describe
Some inquiry but questions are disconnected from one another, from other aspects of learning, & from lived experience	Pupils do find information or explore phenomena, -investigations typically only teacher-driven, short-term, & do not lead to further inquiry	Pupils create: their constructions - typically in just one medium (text or oral) not well-connected to inquiry questions or reflections	Pupils focus on the technical aspects of the creation/collaboration	Pupils narrate, tell, describe in a simple way
Little evidence of questioning or inquiry	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil	Little evidence of meaningful expression

Observer's Comments

1 Scope of questions was limited in the beginning but ultimately more questions regarding the Vikings, the medium and the project in general were discussed
2 Pupils added their own experiences and personalities - applied what they had learned to their own story including historical knowledge
3 The groups discussed ideas on how to make the scenes - changes were made as the discussion continued
4 Although the class worked collectively towards one output there was also evidence of individual inputs
5 The final output included pupils own expressions providing further narrative and texture

Table (IV) Case 2 Vikings

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school	All pupils absorbed throughout	Texts used as a tool or component of creative planning or expression	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning	Digital media are themselves the object of inquiry
Pupils actively participate in activities that are goal orientated[1]	High levels of enthusiasm and engagement[2]	Texts used to revise/reflect/develop	Decision capacity for 'right tool for the job'	Digital media are used transparently with emphasis on task rather than the tool
Learning in limited to specific task & disconnected from other forms of learning; little evidence of carryover to new problems	Everyone engaged at some point but not always	Texts used to organize and to document the project[3]	Some digital tools, use limited to specific purposes, little integration with other ways of learning [4]	Everyone (pupils & teachers) use media hands-on but in a limited way[5]
Some levels of engagement but patchy and unconnected	Most but not all of class engaged throughout	Texts are in use but little connection between texts and other activities	Digital media not observed but an expectation of future use	Outside experts or teacher required to support use of digital media
Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

1 Group learning
2 The group work was busy but some pupils participated to a greater extent than others
3 They used storyboards with dialogue as well as wall charts and learning from history books (from the previous year)
4 This was the first time class had used this technology
5 Progression of digital skills observed

Table (V) Case 3 The Digital Dog

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
Inquiries tend to be more purposeful[1]	Pupils direct investigations in a structured, problem-solving manner to achieve a goal	Pupils decide on appropriate mix of media to express their outputs	Pupils share their work & learning with one another, they use diverse media to connect with & learn from other[4]	Pupils frame the story/message using media to add meaning
Inquiries tend to be somewhat limited in scope	Investigations occasionally result in further inquiries; they incorporate things they are learning using various media & other aspects of the curriculum[2]	Pupils collate or build a story, edit and select elements[3]	Pupils are focused on the story/message rather then the technical details of the media	Pupils use different voices and perspectives to tell/describe[5]
Some inquiry but questions are disconnected from one another, from other aspects of learning, & from lived experience	Pupils do find information or explore phenomena, -investigations typically only teacher-driven, short-term, & do not lead to further inquiry	Pupils create: their constructions - typically in just one medium (text or oral) not well-connected to inquiry questions or reflections	Pupils focus on the technical aspects of the creation/collaboration	Pupils narrate, tell, describe in a simple way
Little evidence of questioning or inquiry	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil	Little evidence of meaningful expression

Observer's Comments

1 Impressed with pupil's close and careful reading - how they though about the story and its meaning- they needed to think and understand deeply in order to make the storyboard
2 Good group work around specific tasks – not going beyond the specific goal of portraying the chapter
3 Good variety of media: text, oral, clay, paper, music, images, camera, fonts, but most pre-selected by teacher - excellent output for creativity pupils express for themselves
4 Good activity to encourage group work and collaboration - mostly led by the groups rather than teacher
5 Variety of media to express feelings and ideas about the story - pupils express themselves as both individuals and groups in a variety of ways

Table (VI) Case 3 The Digital Dog

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school	All pupils absorbed throughout[2]	Texts used as a tool or component of creative planning or expression[3]	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning	Digital media are themselves the object of inquiry
Pupils actively participate in activities that are goal orientated[1]	High levels of enthusiasm and engagement	Texts used to revise/reflect/develop	Decision capacity for 'right tool for the job'[4]	Digital media are used transparently with emphasis on task rather than the tool[5]
Learning in limited to specific task & disconnected from other forms of learning; little evidence of carryover to new problems	Everyone engaged at some point but not always	Texts used to organize and to document the project	Some digital tools, use limited to specific purposes, little integration with other ways of learning	Everyone (pupils & teachers) use media hands-on but in a limited way
Some levels of engagement but patchy and unconnected	Most but not all of class engaged throughout	Texts are in use but little connection between texts and other activities	Digital media not observed but an expectation of future use	Outside experts or teacher required to support use of digital media
Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

1 Integration of activity across the curriculum: art, English, music, tech skills, writing -good group work around specific tasks
2 Very engaging activity involved all pupils at all times while we were in class
3 A lot of use of texts as both input and output - story originated from book - pupils continuously reflected on their story - rich reader response
4 In this case, not so much deciding about the tool, but using an array of tools very effectively
5 Media used as means to an end but also for IT skills

Table (VII) Case 4 Banana Split

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning[3]	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
Inquiries tend to be more purposeful	Pupils direct investigations in a structured, problem-solving manner to achieve a goal	Pupils decide on appropriate mix of media to express their outputs	Pupils share their work & learning with one another, they use diverse media to connect with & learn from other[4]	Pupils frame the story/message using media to add meaning
Inquiries tend to be somewhat limited in scope[1]	Investigations occasionally result in further inquiries; they incorporate things they are learning using various media & other aspects of the curriculum[2]	Pupils collate or build a story, edit and select elements	Pupils are focused on the story/message rather then the technical details of the media	Pupils use different voices and perspectives to tell/describe[5]
Some inquiry but questions are disconnected from one another, from other aspects of learning, & from lived experience	Pupils do find information or explore phenomena, -investigations typically only teacher-driven, short-term, & do not lead to further inquiry	Pupils create: their constructions - typically in just one medium (text or oral) not well-connected to inquiry questions or reflections	Pupils focus on the technical aspects of the creation/collaboration	Pupils narrate, tell, describe in a simple way
Little evidence of questioning or inquiry	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil	Little evidence of meaningful expression

Observer's Comments

1 Pupils participated actively in the lesson - they were quite spontaneous in answering questions about what they had learned
2 The activities and goals were set by teacher
3 Artefacts (storyboards, media, photographs etc.) have potential lasting value - these could be reviewed in the future to be used for language learning
4 The media we observed were the digital camera, use of notes, the ingredients and discussion
5 Added meaning by way of slide show, photographs, text, music and eating the banana splits!

Table (VIII) Case 4 Banana Split

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school	All pupils absorbed throughout	Texts used as a tool or component of creative planning or expression	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning	Digital media are themselves the object of inquiry
Pupils actively participate in activities that are goal orientated[1]	High levels of enthusiasm and engagement[2]	Texts used to revise/reflect/develop[3]	Decision capacity for 'right tool for the job'	Digital media are used transparently with emphasis on task rather than the tool
Learning in limited to specific task & disconnected from other forms of learning; little evidence of carryover to new problems	Everyone engaged at some point but not always	Texts used to organize and to document the project	Some digital tools, use limited to specific purposes, little integration with other ways of learning[4]	Everyone (pupils & teachers) use media hands-on but in a limited way[5]
Some levels of engagement but patchy and unconnected	Most but not all of class engaged throughout	Texts are in use but little connection between texts and other activities	Digital media not observed but an expectation of future use	Outside experts or teacher required to support use of digital media
Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

1 Pupils participated actively in the lesson
2 During the demonstration, pupils were quite engaged - perhaps seeing themselves in the stories was of interest
3 We point to the slide show texts to support this
4 Big jump to the next level descriptor - in particular, there was integration with other ways of learning but they did not have decision capacity
5 Everyone (pupils and teachers) used media hands-on but in a limited way

Table (IX) Case 5 The Three Little Pigs

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
Inquiries tend to be more purposeful[1]	Pupils direct investigations in a structured, problem-solving manner to achieve a goal	Pupils decide on appropriate mix of media to express their outputs[3]	Pupils share their work & learning with one another, they use diverse media to connect with & learn from other[4]	Pupils frame the story/message using media to add meaning[5]
Inquiries tend to be somewhat limited in scope	Investigations occasionally result in further inquiries; they incorporate things they are learning using various media & other aspects of the curriculum	Pupils collate or build a story, edit and select elements	Pupils are focused on the story/message rather then the technical details of the media	Pupils use different voices and perspectives to tell/describe
Some inquiry but questions are disconnected from one another, from other aspects of learning, & from lived experience	Pupils do find information or explore phenomena, -investigations typically only teacher-driven, short-term, & do not lead to further inquiry[2]	Pupils create: their constructions - typically in just one medium (text or oral) not well-connected to inquiry questions or reflections	Pupils focus on the technical aspects of the creation/collaboration	Pupils narrate, tell, describe in a simple way
Little evidence of questioning or inquiry	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil	Little evidence of meaningful expression

Observer's Comments

1 More purposeful in the first visit when pupils were scoping out what was needed for the project
2 Investigation mostly tied to doing the project
3 Activities involved the creation of backdrops, clay figures, houses, other objects, storyboard, drawing, use different media – collaborative process noted
4 Good collaboration - no conflicts
5 Good response to story

Table (X) Case 5 The Three Little Pigs

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school	All pupils absorbed throughout[2]	Texts used as a tool or component of creative planning or expression[3]	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning[4]	Digital media are themselves the object of inquiry
Pupils actively participate in activities that are goal orientated[1]	High levels of enthusiasm and engagement	Texts used to revise/reflect/develop	Decision capacity for 'right tool for the job'	Digital media are used transparently with emphasis on task rather than the tool
Learning in limited to specific task & disconnected from other forms of learning; little evidence of carryover to new problems	Everyone engaged at some point but not always	Texts used to organize and to document the project	Some digital tools, use limited to specific purposes, little integration with other ways of learning	Everyone (pupils & teachers) use media hands-on but in a limited way
Some levels of engagement but patchy and unconnected	Most but not all of class engaged throughout	Texts are in use but little connection between texts and other activities	Digital media not observed but an expectation of future use	Outside experts or teacher required to support use of digital media
Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

1 Pupils were engaged in the task at hand and actively participated in the design and creation of their backdrops
2 All pupils seemed to be interested in the task and asked and answered questions enthusiastically
3 Story of Three Little Pigs formed the basis of the pupils' work.
4 Evidence of use of digital tools - teacher was concerned that too much time was spent on 'other materials'
5 Observers found that none of the above apply

Table (XI) Case 6 Fractions

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
Inquiries tend to be more purposeful	Pupils direct investigations in a structured, problem-solving manner to achieve a goal	Pupils decide on appropriate mix of media to express their outputs	Pupils share their work & learning with one another, they use diverse media to connect with & learn from other	Pupils frame the story/message using media to add meaning
Inquiries tend to be somewhat limited in scope	Investigations occasionally result in further inquiries; they incorporate things they are learning using various media & other aspects of the curriculum	Pupils collate or build a story, edit and select elements	Pupils are focused on the story/message rather then the technical details of the media	Pupils use different voices and perspectives to tell/describe
Some inquiry but questions are disconnected from one another, from other aspects of learning, & from lived experience	Pupils do find information or explore phenomena, - investigations typically only teacher-driven, short-term, & do not lead to further inquiry[2]	Pupils create: their constructions - typically in just one medium (text or oral) not well-connected to inquiry questions or reflections[3]	Pupils focus on the technical aspects of the creation/collaboration	Pupils narrate, tell, describe in a simple way[5]
Little evidence of questioning or inquiry[1]	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil[4]	Little evidence of meaningful expression

Observer's Comments

1 Not an ideal activity-project to encourage pupils to ask questions - they were asked questions by the teacher rather then facilitated to make their own inquiries
2 Wider questions may have facilitated a greater level of pupil investigation
3 There was little evidence in this revision class of the create/construct components
4 During the observation there was no group work
5 Pupils were asked to consider units of currency and whole numbers - if you had a cake and divided it in two etc.

Table (XII) Case 6 Fractions

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school	All pupils absorbed throughout	Texts used as a tool or component of creative planning or expression	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning	Digital media are themselves the object of inquiry
Pupils actively participate in activities that are goal orientated	High levels of enthusiasm and engagement	Texts used to revise/reflect/develop	Decision capacity for 'right tool for the job'	Digital media are used transparently with emphasis on task rather than the tool
Learning in limited to specific task & disconnected from other forms of learning; little evidence of carryover to new problems	Everyone engaged at some point but not always	Texts used to organize and to document the project[3]	Some digital tools, use limited to specific purposes, little integration with other ways of learning[4]	Everyone (pupils & teachers) use media hands-on but in a limited way
Some levels of engagement but patchy and unconnected[1]	Most but not all of class engaged throughout[2]	Texts are in use but little connection between texts and other activities	Digital media not observed but an expectation of future use	Outside experts or teacher required to support use of digital media[5]
Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

1 Some of the children were not as interested as others and did not follow on with class - although teacher did encourage all to participate
2 Teacher ensured everyone was asked questions but not all volunteered responses - some much more participative then others
3 There was text on the whiteboard but mostly symbolic -this was a revision class - may have used texts more in previous class
4 At times the sunlight made it difficult to read whiteboard - pupils did not directly interact with whiteboards or with each other in groups
5 The teacher used the whiteboard - the pupils observed

Table (XIII) Case 7 Memories

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
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Some inquiry but questions are disconnected from one another, from other aspects of learning, & from lived experience	Pupils do find information or explore phenomena, -investigations typically only teacher-driven, short-term, & do not lead to further inquiry	Pupils create: their constructions - typically in just one medium (text or oral) not well-connected to inquiry questions or reflections	Pupils focus on the technical aspects of the creation/collaboration	Pupils narrate, tell, describe in a simple way
Little evidence of questioning or inquiry	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil	Little evidence of meaningful expression

Observer's Comments

1 The girls mostly focused on the project details
2 No comment
3 Choice about specific music, transitions, photos; not about overall media selection
4 Collaboration observed -sometimes around how to do technical steps
5 Pupils were very expressive in their recollections, especially of their earliest memories, and referred to people, places etc. -in their photos and when relating their stories

Table (XIV) Case 7 Memories

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school	All pupils absorbed throughout[2]	Texts used as a tool or component of creative planning or expression	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning	Digital media are themselves the object of inquiry
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Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

1 No comment
2 Most of the pupils seemed absorbed in their work - may have benefited from a group work element
3 Text was integral to the photo stories - narratives written by the pupils were to be incorporated into the project
4 No comment
5 Teacher uploaded photos for pupils - pupils did not directly use digital technology

Table (XV) Case 8 Saint Patrick

Ask	Investigate	Create	Discuss/Communicate	Reflect/Expression
Significant questions e.g. recognising both the affordances & the constraints and/or the nature of the mediation of the topic	Pupils initiate their own investigations based on their own learning needs or perceived needs of the community	Lasting value or use; pupil's work becomes a basis for further action & learning	Pupils act to communicate beyond their peers for message rather than affirmation	Rich expression of ideas & feelings; learning growing out of expressive activities
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Little evidence of questioning or inquiry	Little evidence that pupils investigate phenomena, gather data, explore questions, or gain new knowledge through active inquiry	Little evidence of create/construct activity	Nearly all of pupil work is solitary or in a restricted mode just between the teacher & the pupil	Little evidence of meaningful expression

Observer's Comments

No comments

Table (XVI) Case 8 Saint Patrick

Participation Depth	Participation Scope or number	Print Literacy	Media Ecology	Use of Digital Media
Pupils show deep involvement in learning; activities are well integrated with other aspects of the curricula and/or their lives beyond the school	All pupils absorbed throughout	Texts used as a tool or component of creative planning or expression	Diverse set of tools for working in different media - full integration of digital technologies with other tools for learning	Digital media are themselves the object of inquiry
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Pupils are disengaged & passive	Very low levels of participation an engagement throughout	No evidence of texts	Little or no use, or intent to use, digital tools & environments	No evidence of use or expectation of use of digital media

Observer's Comments

No comments

Appendix 3 *Digital Literacy Classifications*

Case 1 Bill's New Frock

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

Case 2 Vikings

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

Case 3 The Digital Dog

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

Case 4 Banana Split

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

Case 5 The Three Little Pigs

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

Case 6 Fractions

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

Case 7 Memories

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used

Case 8 Saint Patrick

Digital Literacy
Digital media practices transform the inquiry cycle of learning
Digital media practices act toward enabling and sustaining the inquiry cycle of learning
Digital media practices act toward usage skills
Digital media practices act toward learning technical skills
Digital media practices not used