A review of digital literacy in 3 – 16 year olds: evidence, developmental models, and recommendations

PART B: SUMMARY OF EVIDENCE

Project aims:

This project fits within the following general aim: “To increase the number of learners with the skills and abilities to access and make effective, safe, discriminating use of technology for learning”.

It has the following specific aims:

- To gather evidence to answer 14 Becta-generated questions relating to digital literacy in UK 0-16 year olds
- To determine what effective digital literacy looks like, and what enables and blocks its development
- To summarise the models of digital literacy with the aim of finding a framework that could be used by partners and practitioners.

Dr Tabetha Newman, Timmus Limited
November 2008
WHAT IS THIS DOCUMENT ABOUT?

This review is directly relevant to those interested in how to optimize the skills of defining, accessing, understanding, creating and communicating information whilst using digital technologies (ICT). These skills are collectively known here as digital literacy skills.

The heart of digital literacy skills relate to ideas (critical thinking), not keystrokes (using a computer).

Most of the evidence relating to the learning of digital literacy skills comes from studies of formal educational activities, i.e. when students are set a task by a practitioner. Students are also likely to learn digital literacy skills during their leisure time, when they explore using ICT. However, evidence suggests that the best skills are learnt during formal educational activities, which then empower learners during their informal investigative behaviours.

The majority of digital literacy research focuses on web search behavior, which is only one small part of digital literacy. Evidence from the more general field of information literacy (critical thinking) was also included where relevant in order to broaden the evidence base.

WHAT ‘S INSIDE THIS DOCUMENT?

This is one of three documents that summarize this project. Inside this document, Part B, is a summary of evidence about digital literacy. The full quote taken from the source evidence is available in Part C, the 120 page ‘catalogue of evidence’. There is also a short executive summary of the findings (Part A).

PART C: CATALOGUE OF EVIDENCE
(120 pages)

PART A: EXECUTIVE SUMMARY
(10 pages)

PART B: SUMMARY OF EVIDENCE
(50 pages)

1. What is digital literacy?
2. What skills are we trying to teach, and how do we measure them?
3. How do we teach these skills?
4. THE 14 QUESTIONS ABOUT DIGITAL LITERACY GENERATED BY BECTA
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ACKNOWLEDGEMENTS

My thanks go to Dr John Crawford and Christine Irving for their advice, comments and suggestions regarding suitable sources for this review. To the other experts who provided comments to include (in particular to Dave Whyley from the Wolverhampton e-confident learner team) to Lorna Lewis at Becta for supplying the information to help answer Question 12 regarding current curriculum expectations, and to Andrew Fleming at Becta for providing some of the articles in full. Finally to Andrea Shirley for providing an ‘open door’ through which we could discuss the evolution of this project, and manage expectations. This allowed me to create the most relevant deliverable for Becta’s requirements.

METHODOLOGY

This document (Part A: Summary) takes evidence found in a variety of sources, most frequently from peer-reviewed journals, (Table 1) and summarises it. This document is supported by a separate, substantial catalogue of evidence document (Part B) which contains the exact quote from the reference source, together with more detailed information relating to the answering of the 14 questions generated by Becta about digital literacy (Table 2).

In order to answer the 14 Becta-generated questions (Table 2. The 14 questions identified by Becta, answered by searching the literature for evidence. Each was given a shorter title (right hand column) to act as the chapter headings in this document. Table 2) effectively, evidence was sourced from international papers published in 2000 onwards. This included papers relating to information literacy, digital literacy, media literacy, and the multitude of other terms used to describe this area of study.

| Sources of information               | Published articles                      |
|                                    | Internet searches                       |
|                                    | YouTube videos                          |
|                                    | Books                                   |
|                                    | PowerPoint presentations                |
|                                    | Becta documents                          |
|                                    | Communication with experts               |

| Number of information sources reviewed | 160 |
| Number of information sources included | 67  |
| Timeframe of project                  | September – November 2008               |

Table 1. Summary of sources of information used, and amount of source evidence reviewed
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<td>11 What advice about digital literacy is currently (or soon to) influence learners, parents and teachers? Is there any conflict in advice?</td>
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Table 2. The 14 questions identified by Becta, answered by searching the literature for evidence. Each was given a shorter title (right hand column) to act as the chapter headings in this document.
WHAT IS DIGITAL LITERACY?

- This area of study is greatly hampered by the many names and definitions used to describe information-seeking and evaluation using digital technologies (notably information literacy, digital literacy, and media literacy).

- It is also hampered by overly complex terminology, which can confuse rather than inform. Simply put, we are looking at the use of critical thinking skills in the context of technology use. This requires both an understanding of how to use ICT (‘digital skills’) and an understanding of how to find, evaluate and communicate information (critical thinking skills) (Figure 1).

![Figure 1. The relationship between ICT Literacy, Digital Literacy and Information Literacy](image)

- Most information literacy and digital literacy theory assumes that a person is completing problem- or project-based task (during ‘formal learning’). Educating them on the five critical skills listed above will optimise their ability to critically evaluate and use that information. This focus lends itself to the education sector, where students are often asked to complete research tasks. In contrast, media literacy and e-safety tend to focus more on arming people with skills and knowledge to cope effectively with information that they come up against during informal, exploratory behaviour, often outside of the education sector.

- The term media literacy is sometimes used to mean exactly the same as digital literacy. However, the term media literacy comes from the context of educating people about how to choose and evaluate television and other media that they consume, often during leisure time (i.e. within informal learning environments).

- It is important to clarify that the focus of digital literacy is not on technical aspects of how to use computers or other digital technologies. Instead it is more towards critical thinking skills: learning how to effectively identify need, find, use, summarise, evaluate, create and communicate information (hence why digital literacy is sometimes discussed under the term information literacy).

- Unlike a lot of information literacy frameworks, digital literacy acknowledges the importance of formal and informal communication and group work during task-based activities, reflecting the rise of Web 2.0
technologies and the importance of social networking and collaborative learning in today’s society and workspaces.

- Digital literacy has been defined as:

  “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”.1

- Context often leads to the creation of unique ‘working’ definitions. This assists explanation to others, and/or recording and assessment. For example in relation to informing Norwegian teachers about digital literacy, it was defined as ‘... the ability to use digital artefacts as an integrated part of pedagogical content knowledge and be aware of what implications this has for teaching, learning strategies and [pedagogy]’

- Experts in this field have recently called for researchers and policymakers to acknowledge a pluralized ‘digital literacies’. This umbrella term includes media literacy and others, and acknowledges that there are subtle differences between literacies depending on the environmental and/or learner context (Figure 2). However, this is still not a complete solution, because some ‘media literacy’ falls outside of a digital sphere, most notably the use of books and newspapers.

- **Context** and **terminology that assists effective communication**, then, seem all important when discussing this area of research.

- Researchers, librarians and policy makers should avoid becoming bogged down in defining and demarcating the fields of information, digital and media literacy. The important focus should be to create understandable explanations relating to practical skills and the context in which they will be taught.

- From the literature we can conclude that there is room, and validity, in allowing a multitude of literacies to exist harmoniously. The responsibility of those organising digital literacy education should be to use terminology that is:

  1. Appropriate for the context in which it will be used
  2. Understandable to the intended audience and learners
  3. Explicitly states whether the focus is on keystrokes (e.g. ICT skills) or ideas (e.g. information literacy)
  4. Provides tangible examples of ideal behaviours

In this way we maximise the likelihood of effective communication, and effective learning, between the parties involved.

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1 As defined by Lampros Stergioulas of Brunel University, UK, director of the e-START Digital Literacy project, in his *PowerPoint presentation* (2006) entitled “The pursuit of Digital Literacy and e-Inclusion in Schools: Curriculum Development and Teacher Education”
An example of effective terminology and explanation in action is given by Ofcom, who are currently leading an audit of Government Agency work in this area. Ofcom, with a background in regulating media consumption, currently use the term ‘media literacy’ to describe their statutory duty under the Communications Act to raise public awareness about accessing, understanding and creating media-delivered information.

Ofcom’s statutory responsibility falls specifically within the spheres of accessing and understanding communication (Figure 3). In other words, supporting people as they access or experience media content or services, often during their leisure time. Their target audience, the general public, understand that Ofcom is ‘to do with’ television regulation, and so the term ‘media’ makes sense to them. Equally, their creation of explicit skills (use, navigate, manage… etc., see Figure 3) assists effective communication to the public about their remit.

However, in contrast to information literacy models, Ofcom do not consider ‘defining the task’ before accessing, because during informal, exploratory learning (their main remit), citizens rarely consciously define a problem, or the information needed to solve it.

Ofcom are also responsible for ‘literacy’ relating to mobile phone and internet use, which the general public may currently not associate with the term ‘media’. Therefore Ofcom are moving towards listing example competencies rather than using one term.

I would suggest that Becta differs from Ofcom in that its primary goal is to facilitate interaction with (rather than consumption of) digital technologies in a formal (rather than informal) learning environment.

Using Figure 3, Becta would be equally responsible for Access, Understand, and Create (as well as learning to define the problem beforehand, and communicate it afterwards). In this context, the term ‘media literacy’ may well limit public understanding of Becta’s remit.
Figure 3. Ofcom’s priorities in relation to their statutory remit

- I would recommend that Becta agree on a set of skills that they feel fall within their context, for example:

  “assisting young people in effectively defining the problem, accessing, understanding, creating and communicating information whilst using digital technologies”

- Becta could also discuss possible terminology with stakeholders, in order to investigate whether the term ‘media’ is misleading (do teachers consider ‘media’ to include the internet and mobile phone use?).

- The most appropriate terminology for Becta will follow from the context of their perceived remit, and the understanding of their stakeholders.

- Suggestions for what the primary term could be include:
  - Digital literacy
  - Digital media literacy
  - Critical thinking skills in a digital age
WHAT SKILLS ARE WE TRYING TO TEACH, AND HOW TO WE MEASURE THEM?

- In getting entangled in problems of definitions, it is easy to forget to explain exactly which skills we are aiming to teach children in order for them to become ‘digitally literate’.

- Martin summarises what the working group for the European Commission “Education and Training 2010” Programme identifies as the thirteen processes of digital literacy (Table 3):

<table>
<thead>
<tr>
<th>Process</th>
<th>Descriptor</th>
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<tbody>
<tr>
<td>Statement</td>
<td>To state clearly the problem to be solved or task to be achieved and the actions likely to be required</td>
</tr>
<tr>
<td>Identification</td>
<td>To identify the digital resources required to solve a problem or achieve successful completion of a task</td>
</tr>
<tr>
<td>Accession</td>
<td>To locate and obtain the required digital resources</td>
</tr>
<tr>
<td>Evaluation</td>
<td>To assess the objectivity, accuracy and reliability of digital resources and their relevance to the problem or task</td>
</tr>
<tr>
<td>Interpretation</td>
<td>To understand the meaning conveyed by a digital resource</td>
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<tr>
<td>Organisation</td>
<td>To organise and set out digital resources in a way that will enable the solution of the problem or successful achievement of the task</td>
</tr>
<tr>
<td>Integration</td>
<td>To bring digital resources together in combinations relevant to the problem or task</td>
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<tr>
<td>Analysis</td>
<td>To examine digital resources using concepts and models which will enable solution of the problem or successful achievement of the task</td>
</tr>
<tr>
<td>Synthesis</td>
<td>To recombine digital resources in new ways which will enable solution of the problem or successful achievement of the task</td>
</tr>
<tr>
<td>Creation</td>
<td>To create new knowledge objects, units of information, media products or other digital outputs which will contribute to task achievement or problem solution</td>
</tr>
<tr>
<td>Communication</td>
<td>To interact with relevant others whilst dealing with the problem or task</td>
</tr>
<tr>
<td>Dissemination</td>
<td>To present the solutions or outputs to relevant others</td>
</tr>
<tr>
<td>Reflection</td>
<td>To consider the success of the problem-solving or task-achievement process, and to reflect upon one’s own development as a digitally literate person</td>
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</table>

Table 3. The thirteen components of digital literacy, as determined by the European Commission working group

- From the literature, I suggest a simplified framework that ties in with the Ofcom structure, and includes the following five steps: defining the problem, accessing the information, understanding it, creating something with it, and communicating the results.

- Not only is it often difficult to agree as to exactly what the remit of digital information literacy education should be, it is also difficult to determine how to measure and quantify it.

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• Perhaps the best and most recent example of teaching and measuring digital literacy comes from Norway, where they are using the ITU Monitor to measure digital literacy in schools. More information about this can be found in Søby’s chapter of the book Digital Literacies: Concepts, Policies and Practices³.

HOW DO WE TEACH THESE SKILLS?

• Just as there is a wealth of information about possible definitions and possible skills associated with digital literacy, there is also a wealth of information about how to teach it. However, the evidence suggests that suggested teaching methods sometimes fail to reflect research findings.

• There are a number of books that provide examples of how to integrate information literacy, media literacy and digital literacy into teaching, for example:


  Information Literacy: Navigating and evaluating today’s media (2008) Sara Armstrong (USA based)

  Designing digital literacy programs with IMPACT Information Motivation, Purpose, Audience, Content, and Technique (Best Practices for School Library Media Professionals) (2005) Ruth Small (USA based)

• Recent research about carrying out web searches has highlighted that careful thought needs to be given to the design of any e-learning relating to digital literacy. It is better for digital literacy to be taught by people than by machines.

• There is a wealth of evidence to suggest that digital literacy shouldn’t be an add-on course taught independently. Rather it is best taught when embedded into subjects, when integrated in practical task behaviours (notably projects and other research opportunities) and within the context of real life scenarios.

1. TYPICAL COMPETENCIES

Q: What Digital Information Literacy competencies are typically present at each stage of development (preschool, KS1 – 4)?

No research has been carried out to specifically answer this question. However, research is soon to begin on a project that aims to catalogue media literacy competency in primary and secondary schools. This work will be completed by Prof. David Buckingham at the Youth and Media Institute of Education, University of London. It may be worth asking Buckingham’s team to incorporate some of the aspects of this review into the project, if possible and where relevant.

From the evidence that is available we can summarise the following:

• E-literacy in preschool children is mainly driven by social and emotional needs, and becomes embedded via shared experiences. Preschoolers can be discriminating users of ICT.

• Primary children using the web can feel ownership over the task, but often do not interpret and adapt information effectively.

• Most primary school children know the basic skills of locating and selecting information sources on the Internet in order to answer research questions.

• Younger secondary school children have problems with defining the problem, synthesising a central question, and determining the information needed. They find it difficult to specify suitable internet search terms, and difficult to judge the relevance and validity of the results.

• Older secondary school children are better at defining the problem, but find it difficult to locate relevant sources of information. They find it difficult to judge the relevance and validity of internet search results. They also found it difficult to present information in an appropriate way for the intended audience.

• Female students tend to have better digital literacy skills than male students.

• There is a wide variation in individual ability in any one school year group. Students’ development of digital skills are enhanced if they are taught in relation to a subject about which they are already interested and curious.

• School work doesn’t reflect much of the way that ICT is frequently used in the home.

• School children develop more varied digital competence from home ICT use than they are able to do at school. At school they are often passive consumers rather than active producers of media content.

• There is a wide variation in individual use of ICT and therefore digital competencies between schools. Generally, teachers aren’t interested in the educational use of ICT.

• Student background and attitude to school work affects the development of digital literacy.

• Teachers have differing perceptions about the key components of digital literacy, and often place focus on the skill of ‘finding and managing relevant information’, ignoring the equally important skills of summarising, comparing, and evaluating information, and creating new media using digital tools.
• Children with home access who spend more time online have more advanced digital literacy skills.

• Only two-thirds of children currently at school have received some lessons about how to use the internet. Nine-11 year olds and 18-19 year olds are the least likely to have been advised about safety, searching and website reliability.

• Older children are more likely than younger children to learn about digital and media literacy in school. Children in Wales and Northern Ireland are the least likely to have had lessons at school about the internet.

• Children develop media literacy in the absence of explicit attempts to teach it. Most children are good at knowing how to access media content – the first of the three components in Ofcom’s remit (access, understand, create).

• A minority of primary and secondary schools have introduced some form of information literacy education.

• Children’s emerging digital literacy skills reflect their local environment, including length of time they have had a PC at home, the family’s ability to purchase stable internet connectivity, the number of PCs in the home, the location of PCs in the home, parents’ attitudes to computer use, parents’ own experience and skills with PCs, children’s home leisure choices, the computing habits of friends, the technical expertise of friends and relatives, the number of homework assignments that used a PC, and the direct instruction provided by teachers in class.

• An in-depth monitoring study of the embedding of digital literacy education into schools in Norway provides the best evidence and practical experience at the current time (see Søby’s chapter of the book Digital Literacies: Concepts, Policies and Practices\(^4\)).

• There is a difference between the skills suggested in the National Curriculum and those actually learned by pupils, sometimes due to differing terminology and sometimes due to teaching practice. The importance of information skills may not be explained sufficiently in the National Curriculum.

• The current curriculum may not recognise the skills now required in our increasingly multimodal society. Preschool children now engage with interactive websites, TV programmes and other media and technologies which shape their literate identity. Children are becoming active participators and developers using technology. Competence can no longer be considered just as an individual competency, but also through the concept of collective intelligence. Children need to use technology to share ideas, evaluate others and work collaboratively.

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1. ENABLERS

Q: What enables the development of good Digital Information Literacy skills? What are the most important enablers?

The following organisational, teaching-related and student-related enablers are identified in the literature and by experts:

Organisational

- Digital literacy education should be clearly anchored within the curricula, syllabus, assessment, and everyday practice in schools in order to become institutionalised.
- Digital literacy education must be embedded into the curricula as a whole, rather than taught only in media studies or via internet driving licences.
- Textbooks for all subjects should mention digital literacy. When they do so, users should not just point to the publishers' own online resources.
- An involved headmaster is important for sustainable integration of digital literacy education.
- To integrate digital literacies, changes must occur at the school level. The necessary technology is required, but this must be accompanied by staff training both about technical and digital literacy aspects, and about how to teach and learn with new media.
- In order to be realistic, policy holders should have three measures of digital literacy in terms of what is intended (by policy makers), what is implemented (by schools), and what is achieved (in students).
- Digital literacy can be perceived in terms of the benefits to the individual versus the benefits to society. The latter viewpoint is more likely to lead to reflective teaching and learning practice, and a broader cognitive perspective of digital literacy.
- Information literacy education should be intertwined with problem-based or project-based learning, and should incorporate collaboration between teachers, school librarians, and media specialists in order to bridge the gap between classroom activities and the requirements of the real world.
- Government agencies, schools and corporations should collaborate to develop information literacy policies that are current and relevant to market demands.
- The general public need to be informed of the importance of digital literacy skills. In this way, society will attach more worth to the issue, and will raise the profile of these skills across all walks of life.
- The design of school libraries has the power to facilitate or impede the development of student information literacy skills. Collaborative space, allowing for student discussion, is important.
- Single access to a laptop computer throughout the school day leads to better reading and writing skills, more collaborative and authentic work, and better digital literacies such as the analysis of information or the production of multimedia. However, this access didn’t improve test scores or erase academic achievement gaps.
• The inclusion of digital literacy education is best achieved if teachers and students can be persuaded that this is a valuable skill from which they will receive pay-back. There is therefore a desperate need for more research and outcomes data.

• Digital literacy education is more likely to be effective if parents and teachers are involved, rather than via the use of online or other resources.

• There should be educational intervention to teach online skills and to increase time spent online in order for children to experience online opportunities and acquire digital literacy skills.

• Young people (particularly those defined as ‘inexperienced risk takers’) and their parents should be targeted by schools to increase their digital literacy.

• Parental advice should be tailored depending on the level of parental ICT expertise and the way in which an individual child interacts with the internet (four ‘types’ were identified: inexperienced risk taker, all-round experts, skilled risk takers, low risk novices).

• Parents can help teach digital literacy, for example by explaining the relationships between media representation and reality.

• ICT and internet access, perceived relevance, and community/peer opinion of digital literacy affect how much it is taught in schools and at home.

• School internet use should be geared towards practice for the real world. Most skills, particularly higher-order thinking skills incorporated within internet literacy, are best achieved in formal learning environments, in structured and directed learning situations.

• ICT and an associated digital literacy thread should be integrated across the curriculum, with teachers explicitly linking their teaching, where relevant, to information skills. A practical strategy for doing this should be determined and agreed at school level. Resource-based learning and projects would be ideal opportunities for integrating ICT and digital literacy training.

• Support of senior management is key – in schools that means head teacher, SMT (senior management team) backed up by resources - people, hardware, software, skills training, ongoing financial funding and commitment.

• Context-dependent research skills will be enhanced if students are allowed the chance to interact with people with different professional skills sets e.g. teachers + librarians + ICT personnel + classroom assistants and or nursery nurses.

• Cross curricula activities, cross school activities, and transition work provide different contexts for information to be found, used, evaluated and shared.

• Reliable technology (from whiteboards to learning platforms) together with ongoing support and training, is vital.

Teaching-related

• Teachers must see the added value of ICT before they will use it in teaching their subjects. In-service teaching about digital literacy is vital for this to occur.
• For teachers, learning about digital literacy is best achieved by providing them with interactive and hands-on opportunities. The opinions of their local peers are also important.

• In order to capture the attention of teachers, there needs to be a shift from focusing on ICT skills towards educating them about the nature and methods of teaching digital literacy, and ensuring that schools embed it within all subjects rather than providing it as a separate context-free add-on.

• Teachers’ digital literacy is better when they have access to a personal laptop, and encouragement from their colleagues and local leaders.

• Teachers need to give greater consideration to the quality of the learning experience as opposed to the production of an end product.

• Providing practitioners with a model for the process of information-seeking, or the development of information literacy skills may not be as helpful as much as allowing them to discuss, collaborate and form a consensus about the subject at their local (school) level. This is because teacher and librarian collaboration must be founded on shared understanding, acknowledging the differing priorities between students, teachers, librarians, national policy and the curriculum.

• The skills associated with Web literacy (searching, reading and evaluating online information) overlap and are mutually connected. It should therefore be taught as a whole rather than splitting it into smaller parts. Ideally curricula should embed web literacy skills within inquiry activities so that students see the link between the skill and its actual use for a meaningful goal.

• Providing teachers and librarians with an opportunity to discuss digital information literacy issues may provide a constructive route to integrating digital literacy into the classroom and library.

• Allowing teachers and librarians to agree and create their model of digital literacy, relevant to their local circumstances, allows a sense of ownership and prevents restriction of the skills and processes these practitioners believe to be relevant to their educational context.

• When integrating information literacy into schools it is important to have standards as guidelines to determine goals to be achieved. There should be objectives to each goal, which are relevant to the type of student you will be teaching.

• To successfully integrate digital literacy education in schools, teachers must understand the learning outcomes and the instructional strategies used in the design of class assignments. They need to ask the right types of questions to facilitate suitable web information-seeking behaviour.

• We need to acknowledge that reading from the web is qualitatively different from reading from a book. It is easy to skim too quickly online, without absorbing information.

• Practitioners should consider where to allow their students to search online before setting them a task. Students do not understand their role as knowledge makers, or the need for responsible information use. Their needs, skills, and language development may not match the design of the Web. Practitioners should therefore consider how a certain search engine might match the needs of the students and whether it uses the kind of language they use. Practitioners should also decide whether the task they have chosen is best answered by searching on complex, hyperlink-rich sites or via a more constrained, linear search facility.
• Practitioners should consider the format of the final product in order to avoid restricting the students’ ability to express themselves with digital media. Asking them all to create the same thing, as e.g. a poster about the same subject, will not take advantage of what they and the web can offer.

• When using group learning, practitioners should use open-ended questions that facilitate a wide variety of individual responses. This discourages the ‘cut and paste’ mentality and assists students in evaluating and creating new information (part of digital literacy).

• Younger teachers, who have grown up with technology, often integrate technology effortlessly into their teaching, creating a classroom environment that is one of challenge, reflective risk-taking, and collective intelligence.

Student-related

• Students develop more enhanced digital literacy skills when they are asked to first formulate both a question to be answered, and some provisional answers of what they might expect to find. In this way they show more commitment to and ownership of the project. Formulating provisional answers also illustrates their prior knowledge.

• Allowing children to search the web collaboratively enhances their interpretation and allows them to discuss findings according to their prior experiences, knowledge and interests, and so learn from one another.

• The local environment is an important motivational factor for secondary students completing project work. Their engagement in the information-seeking process was influenced by the resources provided, the physical layout of the room, and the ambience of the room. They were more motivated to work in a comfortable, attractive environment where they were allowed to get up and move about easily. Working in groups was also valued.

• The more students use the internet, email, and other forms of internet communication methods, the faster they improve when taught digital literacy skills (collecting, judging, practically using, expressing, and communicating information).

• Students of all ages become better searchers when they orientate, test, monitor, steer and evaluate the process constantly.

• Students grasp information literacy skills more effectively when their innate interests are stimulated and applied to their project work.

• Students are more engaged with digital literacy education when it includes collaborative instruction and discussions between students.

• Research from HE shows that information literate students are those that frequently read, use the internet, and use the library to read. They are also more likely to be information literate if they have completed written assignments in an essay format.

• A better focus on wider critical thinking skills, and practicing them in different contexts, would enable better digital literacy skills.
• Children pick up digital literacy in informal settings, notably when using the computer at home, both at home and alongside family and friends.

• The creation of well-scaffolded portals (rather than free range across the web) helps students to be more goal-driven and locate question-related information to successfully complete information-seeking educational tasks.

• Students learn better when digital literacy activities are centred within a meaningful concept and task.

• Children need to understand the ‘real world’ application for any learning.
2. BLOCKERS

Q: What blocks the development of good Digital Information Literacy skills? What are the most important blockers?

The following cultural, organisational, teaching-related and student-related blockers are identified in the literature and by experts:

Cultural

- We are not acknowledging that today’s children do, in fact, take part in the same world as adults. School-based literacy instruction was created in the context of strict delineation of time, activity and purpose – in an era pre-dating the digital childhood, text, and new technologies and the practices accompanying them. There is still a belief that information flows to children in school, and that real life starts at adulthood. This is no longer true, now that children’s increasing access to and mastery of new texts and technologies gives them unprecedented access to the same pool of information as adults, often without adult mediation. We are therefore underestimating certain aspects of children’s emotional and physical maturity.

- Traditional literacy education in schools focuses on mastery and rendition of pre-set models rather than celebrating the ability - and right - for children to produce, disseminate and comment on information. Today’s children feel enabled and encouraged to do so by the technologies available to them.

- Children are tuning into a wealth of digital technologies and need literacy practices orientated towards multimodality rather than a focus only on print-based outputs. Digital technologies should be embedded into daily classroom pedagogy, and children (especially those most at risk of poor outcomes from schooling) should be encouraged to engage in these new technological forms of textual and social practice.

- Lower classes of parents are far less likely to have ICT facilities at home, and particularly in the workplace. Hence they, and their children, are likely to have less developed digital literacy skills than middle class parents and children.

Organisational

- Often computers are situated outside the normal classroom, and there is effort involved in trying to access them.

- There are often uneasy relationships between students, academics and librarians which can inhibit the development of e-literacy education. Students need to feel able to approach librarians in a friendly, informal way to ask questions.

- Current education creates a split between school and home spaces, but children’s digital technology practices flow across both. This should be acknowledged.
Few studies focus on the transformative influence (or otherwise) of new technology in the primary school curriculum. In primary schools ICT is seen as an enrichment opportunity, rather than one which can transform learning.

Research into information-seeking is often not reflected in the practices of teaching in the education system.

There is hardly any correlation between what is taught (where to find sources, how to order information) and what is assessed (correct facts and analysis) in terms of information seeking behaviour. It may be better to instead focus on getting students to understand the variety of user perspectives on an issue in relation the users’ context.

The current focus on Information literacy is on individualised, principally text-based skills rather than on the preparation of individuals to engage in information environments which are collaborative, complex, and messy. This means students may leave education without the skills needed to enter the workplace or work as part of a team.

Information literacy education shouldn’t be confined to the discipline of information studies or library science, and it should be an important feature of any ICT study.

Lack of progress in relation to UK information literacy education may well not be due to lack of understanding about the issue. Rather there seems to be two main blockers: how to morph the concept into something relevant to the context of each school; and the perceived mismatch teachers feel exists between curricular priorities and learner-centred priorities.

The effective development of information literacy in schools should be seen as a process of professional, inter-professional and curricular development as much as learner development.

Policies, rules, technological and filtering controls and time constraints impact on teachers so as to limit their ability to support the development of information literacy in the curriculum.

Most information literacy education in UK primary and secondary schools is poor. Sessions are often superficial, repeated information already known by pupils, and didn’t form part of a coherent programme across the curriculum.

Information literacy teaching in UK schools is often not ambitious enough, covering information and skills that students already had.

Social class and economic status are the most well established barriers to media literacy. This relates to the quantity and quality of access.

There is a growing gap between the success of policies relating to ICT infrastructure in schools, and those relating to the pedagogical use of ICT. This is particularly true for teacher training, which doesn’t include enough education about use of ICT across all subjects and levels to assist learning.

There is a discrepancy between educational policy making (often characterised by short-term thinking) and long term visions for education in a complex world. It is not just schooling that must change, but also the wider socio-economic system, cultural mindsets and governance frameworks.

There is a discrepancy between the viewpoint of current generation of decision makers (from politicians to teachers) and that of the younger ‘digital generation’. Today’s decision makers try to restrict digital media, which is a short term solution for a long term challenge.
• If schools don’t start to incorporate digital literacy education, they run the risk of basing their teaching on presentation, communication and assessment methods that are about to become obsolete in both form and content.

• Media literacy education is rarely present in primary schools.

• There is little evaluation of media literacy education in formal schooling or within the informal sector.

• Schools are doing less information literacy training than they did in a pre-digital world, where problems were far fewer.

Teaching-related

• Teachers often incorrectly perceive children’s Web skills as better than their own. Children may be better at navigating, but when it comes to mature methods of searching, processing and evaluating teachers have the upper hand.

• All too often teachers have specialist subject knowledge, but they have been trained in such a way that this stays separate to knowledge relating to effective teaching methods.

• What digital literacy is taught in schools this mostly refers to certain fragmented aspects of Web skills which are generally not based on research.

• Students should not be taught digital literacy via isolated assignments or worksheets that treat each skill as though it were a separate entity. Web skills should be embedded into all levels and subjects, so showing the interconnectedness of Web skills, and illustrating their context and functionality.

• Random Web surfing should be avoided in schools (as should printing out of copious web pages ‘as is’). This is what children and adults often prefer at home. At school practitioners have the opportunity to educate about Web skills such as effective search engine use, and summarising information in the context of a given task.

• The success of digital literacy programmes in schools often relates to the teaching style of the practitioner. Practitioners must avoid a wholly traditional teaching approach, and instead need to value and incorporate socio-constructivist elements like collaboration, and class discussion. They should also focus on allowing students to acquire practical Web skills relevant to the real world.

• US Librarians feel that secondary students are taught how to select appropriate resources provided in in a variety of formats, avoid plagiarism, document sources, and recognise the accuracy of sources. They feel students are not taught how to develop a question to answer with research, compare sources using technology, or construct search queries with wildcards across different information retrieval systems.

• The teaching of Web skills should be integrated within the teaching of subject matter. However, practical teaching conditions like lack of time, availability of computers and room space, and student assistance may be serious obstacles.

• Teachers often fail to value the ICT experience and expertise that children bring with them, seeing home activities only in terms of ‘playing games’ and preferring to ‘start from scratch’ when teaching ICT activities in school.
Information literacy is understood by UK secondary teachers to be in isolation from the subject curriculum. This may be partly due to the target-driven structure of the curriculum.

When information literacy is taught separately from the subject curriculum there is a danger that students won’t understand the importance of independent information-seeking skills in relation to academic success.

Currently, the way in which information literacy is taught in the UK doesn’t facilitate the evolution of independent learning. This may partly explain the skills gap observed between subjects or between secondary and higher education.

Teachers are often reluctant to invest in reflection time both for themselves and their students, which is an important part of literacy. This facilitates discussion about whether the most appropriate sources and information have been located and used, and whether the output is suitable for the target audience.

Teachers often decide on a deliverable from the students that only relates to informing a younger audience rather than communicating new and more complex knowledge. This hampers full integration of information literacy education with subject knowledge building.

Teacher’s perceptions of their students’ information literacy differ depending on their reflected personal characteristics and experience.

At present UK teachers understand that information literacy is important for lifelong learning, but don’t feel able to effectively incorporate it into the current curriculum.

Teachers do not have a sound grasp on what digital literacy is. They often relate it only to information searches, missing out summarising, comparing, evaluating and creating.

Teachers assume that students are adept with technology, and that technology skills are purely technical. They provide no formal education on how to analyse or understand information, and allow students to search freely.

Older teachers are often ICT under-confident.

Younger teachers are often ICT overconfident, lacking in discrimination (verification, interrogation of information).

Teachers are often reluctant to embrace the importance of information literacy (they should realise it underpins lifelong education, but instead they seem to think it is someone else’s responsibility).

Only the youngest of our teachers have grown up in the digital world. The teacher as expert transmitter of knowledge doesn’t apply any more, and this may be a challenge for older teachers.

Teachers must accept that children might teach and lead in the classroom alongside them, and that this leads to progressive learning opportunities.

Teachers don’t currently have explicit learning strategies focused on the identification and use of digital information.

Many classroom tasks only require learners to recount knowledge, rather than re-contextualise it.

Many classroom tasks do not clarify the purposes for which information is to be identified and used.
• Many classroom tasks don’t include critical judgement and evaluation.

• Most teachers and children haven’t been taught strategies to identify, retrieve and use information across a range of digital sources.

**Student-related**

• Young children consider learning to use ICT as a skill learnt informally at home or within the family, rather than knowledge or skills to be acquired as directed by an adult at school.

• There is a digital literacy inequity between richer-poorer children, which sits alongside the traditional literacy gap. This will lead to a new equity gap involving the skills and identities tied to success in the contemporary world.

• There is a variation in ICT confidence and competence in UK primary children that suggests differing experiences outside of school. Typing, onscreen navigation and the use of pointing devices are essential skills for young writers if they are to succeed in a digital world.

• When other important variables associated with digital skills (age, experience with the Web, availability of hardware and software) are kept constant, differences in gender and education have an influence on the more complex ‘substantial information skills’, but not on ‘formal’ ones. This provides evidence for the assumption that a substantial part of digital skills represent a socially relevant factor for digital inequality, even when education and the spread of new media have standardized the level of formal skills.

• The difference between the digital literacy skills of students from different socio-demographic backgrounds comes not in terms of their ability to complete straightforward ‘closed hypertext’ Web searching tasks, but between their ability to complete freeform ‘open Web search’ tasks, involving evaluation of web page reliability and suitability, simplify complex information, and other substantial information skills. Teachers must therefore rethink their approach to Web literacy education. They may be less skilled at the basic ‘formal’ skills than their pupils, but their substantial skills are highly relevant and should be transferred to their students.

• It is difficult for students with poor reading skills to learn digital literacy skills. There should be particular support for weaker readers when completing digital literacy education.

• Students tend to show poor Web search behaviours that probably reflect the frequency with which they carry out web searches without advice at home. As a result the way they use the Web at school is likely to include random surfing and ‘trial and error’ information seeking. It is important for practitioners to explain that at school, students will learn how to use the Web in a more powerful way, involving more meta-cognitive skills like planning, monitoring and reflecting.

• When high and low achieving students are compared, the high-achievers report a much higher incidence of exposure to basic library skills from their parents, in the school library, classroom or public library in their earlier years.

• Teaching digital literacy skills within higher education is too late – by then individuals have already developed ingrained coping behaviour. They ‘get by’ using Google and do not recognise that they are lacking skills. Information skills must therefore be developed during formative school years.
• Students are de-motivated in project work when they have poor information literacy skills. Factors such as choice of topic, amount of group work, study environment, level of support and level of feedback during the project also affected student motivation.

• Teachers often fail to utilise library and information science services, advice or models to teach and support project work.

• Where information literacy training does occur in secondary schools, it is patchy and taught in isolation of the context of project work (which is an ideal context in which digital literacy should be taught). Students expressed a desire to be taught skills whilst doing research work, but this wasn’t being fulfilled.

• Traditional information literacy instruction may not be effective with non-proficient students, who are unlikely to see themselves as needing or benefiting from such instruction.

• Young information-savvy people think that finding information is simple. They also only desire simple information, served up in bite-sized chunks. They don’t believe they need information literacy training and confuse easy access with effective searching.

• Parents may not teach their children to evaluate information effectively.

• People rely heavily on finding any information quickly using technology, rather than evaluating the quality of information.

• People tend to think, incorrectly, that more results = better answers.

• Students often display a lack of patience to triangulate answers and check sources then present these answers appropriately.

• It is often assumed, incorrectly, that all children are digital natives.
3. IDEAL COMPETENCIES

Q: What would a learner, making effective, safe and discriminating use of technology; look like at each developmental stage (preschool, KS1 – 4)?

- In his book chapter about digital literacy inclusion in the Norwegian curriculum, Søby sets out the following vision of ideal competency:

  In the schools of tomorrow pupils will be using digital media with confidence and innovatively to develop skills, knowledge and competencies, which they will need in order to achieve personal goals and become interactive participants in the information society.

- However, a number of visions of ideal digital literacy by children in the future, there is only one known piece of research that describes the ideal competencies at each UK curriculum key stage. This is the Wolverhampton e-confident learner framework, created by a small number of practitioners and consultants between 2006 and 2008 who aimed to provide a support for practitioners in embedding e-learning across the curriculum.

- The framework aims to describe competencies in children aged between preschool and Key Stage 3. It identifies nine strands of learning that it suggests are important for children to experience in order to become confident 21st century learners (Figure 4).

![Figure 4. The nine strands of learning suggested by the Wolverhampton framework as being vital in order for children to become 21st century e-confident learners](image-url)

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• These nine strands map onto a number of descriptions of competencies that should be present depending on the stage at which the learner finds themselves (ranging from ‘exploratory learner’ – described as usually at level 1 or 2 – up to ‘independent learner’ – described as usually at level 5 or 6).

• So, for example, in the strand of ‘digital thinker’ learners should develop the following competencies (Figure 5):

Figure 5. The ‘digital thinker’ competencies that should be present in children, according to the Wolverhampton framework

• The Wolverhampton framework is quite complex; for example it includes two aspects of ‘digital thinker’. That shown in Figure 5 relates to ‘using mind mapping to scaffold concept development and harness creativity’. The second aspect relates to ‘handling and interpreting data’.

• Several of the nine strands have more than one component to them, some as many as three (e.g. ‘digital author’ and ‘digital communicator’). This complexity, together with the terminology, may make the framework difficult to use in practice other than those already very familiar with it.

• Other than the Wolverhampton framework, an outline of ideal competencies can be taken from the skills outlined in process and developmental models (see chapter 5). In these cases there is no specification of development at a certain age or stage. Instead, development is taken to be a journey personal to an individual, and often within a context (for example, a student may show more digital literacy in one subject than another).

• The UK Literacy Association suggests the following as a basic description of the digital literacy skills to develop at each key stage:
PRE-SCHOOL/FOUNDATION: Children engage with simple interactive narratives and begin to create their own multimodal texts – e.g. through digital drawing and the creation of voiceovers for eBooks.

KEY STAGE ONE: Children start to reflect on how different texts can be used for different purposes and how modes in these can create shared meaning, for example through film. They can then use this to help them plan their own digital texts.

KEY STAGE TWO: Children continue to become active participators with technology. They begin to develop more sophisticated techniques using technology skills such as design, animation and music composition with genre and audience in mind.

SECONDARY: Children increasingly use technology to communicate and exchange information. As well as building on their skills in the primary phase they could use social networking sites to solve, share and develop problems.

- There are a number of related projects about critical thinking (information literacy) skills, but these are not in the context of using technology. One example comes from Southampton LEA, and is now included Bridging Plans: from Key Stage 3 to Key Stage 4 for the subjects of English, Mathematics and Science. A summary of what an effective learner should look like by age 11, 14 and 16 is included. An example of the skills for students aged 16 is shown in Figure 6 (further details are available in the catalogue of evidence document that supports this review summary).

- Similarly, Govan High School in Glasgow has recently identified seven ‘typologies’ and 71 associated ideal skills that students should have in order to be employable, and they are now liaising with local industries and mapping these to the Scottish Curriculum for Excellence to ensure they provide a suitable skills-based education to students.

<table>
<thead>
<tr>
<th>Statement</th>
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<tbody>
<tr>
<td>Are well organised and plan their work confidently, balancing priorities</td>
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<tr>
<td>Show independence in solving problems, selecting the most effective strategy with confidence, and will seek help when needed</td>
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<tr>
<td>When gathering information, do so efficiently and will take notes in a variety of ways, selecting the method to suit the purpose</td>
</tr>
<tr>
<td>Can reorganise their work and re-present it with a clear sense of audience</td>
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<tr>
<td>Are effective team members and can recognise the different roles needed to complete a task and will often take on that role to ensure completion</td>
</tr>
<tr>
<td>Search for purpose for learning and will challenge and question to ensure that what they are learning is appropriate</td>
</tr>
<tr>
<td>Will explore how this fits with existing knowledge and will accommodate any changes to their overall ‘map’</td>
</tr>
<tr>
<td>Assess their own work and can identify areas for improvement and seek help to clarify how they can improve</td>
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</tbody>
</table>

Figure 6. The end-of-key-stage statements for what an effective learner should look like by age 16. This was created by schools in Southampton. Further details are available in Part B – the catalogue of evidence – that supports this document.
4. DEVELOPMENTAL MODELS

Q: What are the existing models for the development of Digital Information Literacy?

Introduction – types of models

- There are at least 40 published models that are, in theory, relevant to this project. Most models relate to information literacy (also known as information, fluency, digital fluency, or information-seeking to name only a few).

- Information Literacy models are considered by many to be equally relevant to users in a digital context – these are critical thinking skills in the context of ICT use. However, others argue that the unique structure of digital technologies such as the internet generates new possibilities (notably in terms of collaborative work) and therefore calls for a different type of model.

- It is usual for a model to be created by authors following a piece of research that used a specific age group, in a specific teaching scenario, in a certain country, and within a certain context. That model is then rarely tested in other contexts.

- Relevant models of (digital) information literacy are based on one of two possible definitions of ‘development’:

  1. The process that an individual should go through in finding, understanding, and validating information each time they are faced with a project- or problem-based task (here I call these ‘process models’)

  2. The developmental pathway which, through time, an individual acquires the skills necessary to be considered to be competent at defining, accessing, understanding, creating and communicating information (here I call these ‘developmental models’).

- In essence then, there is a lifelong journey towards digital literacy, comprised in part (i.e. during formal problem- or project-based tasks) by the iterative use of the steps outlined in a process model (Figure 7).
The main remit of this project was to try to identify a suitable developmental model that describes what effective use of digital technology looks like at certain stages. The focus is therefore on the second of these two types of model – developmental models. However, it is important to first understand process models, because they tend to feature within a developmental model. For this reason we’ll start with a summary of some process models.

Linear Process models

- Most models of digital/information literacy are one dimensional, linear step models.
- In essence, they describe a set of critical thinking skills suitable for effectively solving a problem and/or finding information.
- Nearly all of them relate to information literacy in general, and it is assumed that these steps also relate to evaluating information and information seeking using digital technologies.
- Essentially these process models are all very similar, in that they structure themselves around a linear process through which the person should travel. Most are shown as a linear set of steps. Some are shown as a circular process of steps.
- The most widely known and used approach to teaching information and technology skills is the Big6 Model (Table 4, and see http://big6.com) The model states that people go through the Big6 stages—consciously or not—when they seek or apply information to solve a problem or make a decision. It’s not strictly necessary to complete these stages in a linear order, and a given stage doesn’t have to take a lot of time. This model has gained attention because of its simplicity and ease of use in a wide number of contexts.
- Some practitioners were concerned that the Big6 was too much for young children. Einsberg & Berkowitz therefore created the Super3. The aim here was to create a structure where teachers are able to use vocabulary that children understand (Table 4).
- In his book Getting the Buggers to Find Out (2008) Duncan Grey summarises a number of process models, and introduces the QUICK Model (Figure 8), generated by practitioners during information literacy workshops for teachers in the UK. Grey concludes that the model used is not as important as getting teachers to work together to consider what a model could look like:

“... I learned that the product is less important than the process. By discussing the idea together we created something which was our own and we were able to enthuse about it to other colleagues. So my conclusion is that the best model is the plan you agree with your colleagues and can implement successfully in your school. If your school has ownership of the model it will be more likely to improve pupils’ learning.”

Grey (2008, p.110)
<table>
<thead>
<tr>
<th>Big6</th>
<th>Super3</th>
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<tbody>
<tr>
<td>1. Task Definition</td>
<td>Beginning</td>
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<tr>
<td>• Define the task</td>
<td>----------</td>
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<tr>
<td>• Identify the information needed to complete it.</td>
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<tr>
<td>2. Information Seeking Strategies</td>
<td>Middle</td>
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<tr>
<td>• Brainstorm all possible sources</td>
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<tr>
<td>• Select the best sources</td>
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<tr>
<td>3. Location and Access</td>
<td></td>
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<tr>
<td>• Locate sources</td>
<td></td>
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<tr>
<td>• Find information within the source</td>
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<tr>
<td>4. Use of information</td>
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<tr>
<td>• Engage in the source</td>
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<td>• Extract relevant information</td>
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<td>5. Synthesis</td>
<td>End</td>
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<tr>
<td>• Organise information from multiple sources</td>
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<tr>
<td>• Present the information</td>
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<tr>
<td>6. Evaluation</td>
<td></td>
</tr>
<tr>
<td>• Judge the process</td>
<td></td>
</tr>
<tr>
<td>• Judge the product</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Eisenberg & Johnson’s Big6 Steps involved in problem-solving, and the simplified Super3 for preschoolers

Figure 8. The QUICK Model - a process model created by practitioners during an information literacy workshop held by Duncan Grey

- Questions to ask
  - Understanding and purpose
  - Identify sources
  - Choose relevant information
  - Know what you’ve done (evaluation)
Testing process models in the UK

- The best (and probably only comprehensive) comparison of process models in relation to real world practice in UK schools comes from Williams & Wavell\(^6\). They compared four process models with what teachers feel they really do in the classroom (see the catalogue of evidence document for details).

- Williams & Wavell worked with teachers in UK secondary schools, and concluded that:
  
  o Teachers focus more attention on learning the basic skills of understanding information, and in placing it in the context of a subject. In contrast, process models focus more attention on the importance of defining the need, building new knowledge, and ethical issues.
  
  o Teachers will interpret process models in the context of their method of teaching, and the task in which they find themselves.

Process models – a summary

PROS:

- Process models are useful in explicitly acknowledging and describing the steps that people go through when completing an information-seeking task. Process models are particularly valuable at reminding people about the oft-forgotten steps of task definition and evaluation.

- A general, easy-to-understand process model relating to digital literacy would be useful when completing a task, so that teachers and students don’t forget certain steps, e.g. to clearly define the question to be answered before being let loose on Google.

CONS

- Process models do not identify developmental stages through which people might pass on the journey to become more digitally literate.

- There is no one ‘best model’ to use. All could be said to be equally valid depending on context.

- It is easy to focus on contrasting models in an attempt to find the most ‘accurate’. This is a fruitless exercise. Instead they are best viewed as communication vehicles through which to describe a set of important critical thinking skills that will maximise success during a research task.

- The way in which process models are interpreted relates to the context of use, and the teachers’ own perception of the model.

- By representing the evolution of information literacy as a process of linear stages it is easy to misinterpret this to mean that people have to move through all steps, in order, every time they have an information need.

- Providing a linear process can lead to the misconception that once a step has been visited, that skill has been ‘learnt’ and need not be clarified again.

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\(^6\) Williams & Wavell (2006b) Information Literacy in the classroom: secondary school teachers’ conceptions. See the catalogue of evidence document for details.
Developmental models

- The aim of a developmental model is to map the steps through which a person travels in order to become more digitally literate.

- There are far fewer published developmental models than process models.

- Developmental models can be categorised as two dimensional, or multi-dimensional.

A two-dimensional model: The RSD Framework

- The RSD (Research Skill Development) Framework was first created in 2005 by John Willison, from Adelaide University in Australia, and was initially conceived during his PhD research with Year 8 students and his practice as a High School science teacher.

- The model aims to incorporate several theories of information finding behaviour to create a framework that is relevant from primary to post-graduate education.

- Essentially the model is based around two axes: the first describes the process steps involved in an information-seeking task; the second describes the level of development in terms of how much guidance and freedom the teacher gives in completing the task (see my simplified interpretation in Table 5, and the original RSD in Figure 9).

- The RSD Framework therefore includes both types of model: some process steps (vertical axis) and a framework for plotting development (horizontal axis).

- The vital components to the framework are these two axes (Table 5). The contents of each cell of the full RSD Framework are suggested tasks (Figure 9), but these could be altered depending on teaching context, subject context and/or age of learner.

- The current RSD Framework focuses on information literacy, rather than digital literacy. However the framework is still relevant, and the cells could instead be:
  
  - Populated with digital literacy examples
  
  - Used to map steps in the development of e-safety
  
  - Left blank for the student or teacher to insert an example of a project in which they completed some or all of these process steps at different developmental stages (possibly useful for a student to show when moving between primary and secondary, or to discuss with parents?).

<table>
<thead>
<tr>
<th>Process steps</th>
<th>CLOSED ENQUIRY Learner responds to practitioner-generated question</th>
<th>OPEN ENQUIRY Learner defines own question</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High-level of guidance</td>
<td>Low-level of guidance</td>
</tr>
<tr>
<td>Form question</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Find information</td>
<td></td>
<td></td>
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<tr>
<td>Critically evaluate information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organise information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyse and generate output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate knowledge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. A simplified version of the RSD Framework (as suggested by the author of this review)

**PROS**

- It includes the process model steps for information-seeking, together with an indication of learner competence (from Level 1 to Level 5).
- The Framework provides teachers, students and parents with an overview of the information/digital literacy journey, and an understanding of how specific tasks fit into the framework.
- It allows for personalisation: each student brings a unique digital literacy history, located at disparate points along the continuum. Awareness of these positions and of the continuum itself could help teachers in developing strategies to facilitate the movement of their students towards independent research skills.
- Using this framework could promote behaviour change in teachers (in moving away from high-level guidance) and learners (in understanding their skill development, and providing a sense of ownership over tasks).
- Students typically experience discontinuities in the transitional phases of their studies, e.g. between primary and secondary school. Using the RSD Framework could allow new teachers to see a student’s overall picture of skills, and identify where they are heading, individually and collectively.

**CONS**

- It doesn’t identify any specific digital literacy skills to be mastered. It needs to be populated with example skills.

The most important parts are the 6 facets and 5 levels. The individual cell descriptions are just there as a guide, not a prescription (Willison, pers com.).
A multi-dimensional model: the Wolverhampton's e-confident learner

Wolverhampton's e-confident learner framework (2008)

- This model was published in 2008 following the work of a small number of practitioners working in Wolverhampton, who sought to make sense of some of the challenging issues relating to using ICT in the UK curriculum. They aimed to create this planning tool as a replacement for the QCA units of work.

- The resultant model (Figure 10) was an attempt “to provide a flexible and user-friendly tool” that would “aid schools, practitioners and learners in structuring learning experiences where technology is involved”.

![Spiral Learning Journey](image)

Figure 10. An overview of the Wolverhampton E-confident learner framework, illustrating some of the nine strands, and their spiral development journey from foundation level to KS3.

- Like other developmental models it has one dimension to describe development in terms of learner competence (in this case ‘exploratory’, ‘developing collaborative’, ‘confident collaborative’ and ‘independent’, see Figure 5), and nine others to represent skills to be mastered (Figure 4).

- This model explicitly focuses on digital skills, rather than information literacy in general.

- Further information is provided about what a ‘competent’ learner should look like in each skill, at each learner competence level (Figure 5).
PROS

- It focuses on digital skills.
- It was created within the context of the UK education system, by practitioners, and with regard to recent policies and the curriculum structure.
- It identifies nine dimensions of digital skills and illustrates how they should develop during a child’s journey from preschool through to Key Stage 3.
- It is the only known piece of research that describes the digital skills that are likely to be observed in children at different stages.

CONS

- It doesn’t include a ‘process model’ of task completion.
- Its focus is on cataloguing skills associated with accessing, creating and communicating using ICT, but doesn’t include skills associated with defining the need, understanding or evaluating (the ‘critical thinking’) also associated with digital literacy.
- It is more complex to use than the RSD Framework. Unlike the RSD, the Wolverhampton image of the model (Figure 10) is illustrative rather than providing a usable structure. Teachers/learners must flick through the six skill types and four levels of learner competence (spread across 20 pages) to find the area relevant to their task, level, and context. This may affect the usability of the full framework in practice, and the ability to easily explain it to practitioners and students.
- The terminology is rather generic and open to interpretation. For example, what is the difference between a ‘digital author’ and a ‘digital communicator’? These concepts would need a relative amount of explanation.
- The axis that describes ‘development’ is split into four learner types: exploratory learner, developing collaborative learner, confident collaborative learner, and finally independent learner. However, the literature suggests that there are complex skills involved in working and communicating effectively within a group. There may therefore be concerns about placing ‘collaborative learner’ before ‘independent learner’ in this continuum. The RSD Framework may provide a more usable axis to describe ‘development’.

Making a usable model

For a model to be truly useful it must be simple enough to be convincingly expressed in three or four sentences that can be explained to the relevant community during short conversations.
A warning about models

- Most process and developmental models only describe behaviours associated with solving a task (information-seeking, problem-solving etc). They do not describe unstructured learning associated with viewing, interpreting and evaluating information in informal environments (e.g. whilst watching television or browsing the internet). Alternatively they describe an ‘ideal state’ but not how to get there.

- Models can be constricting. Digital literacy is multi-dimensional and highly context-dependent (e.g. relating to key stage, school methods, teacher personality, subject, task). Evidence suggests that providing too detailed a blueprint for teachers and learners may restrict them.

- Models often assume that learners start with a specific information-seeking task, and go through a set of steps to ‘find an answer’. This may be useful when completing tasks in school, but it is too restrictive a way to perceive digital literacy learning as a whole. Much of this occurs outside of school, where freeform exploratory behaviour is often the norm. A model that only allows for structured question-answering may therefore be restrictive or perceived as irrelevant to learners unless it has a very practical use.

- There is a danger that a model could be used as a prescriptive benchmarking devise or assessment agenda. This must be avoided. Instead it should be seen as a tool enabling a more visionary approach to teaching and learning critical skills, and a communication device between teachers/parents when discussing specific students, or different learning contexts or environments.

Upcoming research

- David Buckingham of Oxford University is soon to begin a three-year project that aims to develop a model of media learning progression, based on research about what children of different ages are capable of understanding (i.e. their media literacy).

Conclusion

- Learners, parents and teachers would benefit from a simple one-page developmental model that has a practical use during problem- or project-based learning tasks.

- The model must be flexible, adaptable and applicable to all levels and settings.

- It should identify the process steps that students go through when completing tasks using digital technologies. Perhaps the greatest benefits to this part of the model would highlight oft-missed stages such as defining the question, and evaluating results.

- A suitable model should include some suggestions and guidance with regard to digital capabilities at each developmental stage (e.g. in relation to key stage).

- There are two developmental models that seem relevant to this need: the RSD Framework and the Wolverhampton e-confident framework. Neither of these were designed specifically for this task, and therefore need modification.
I suggest that an adapted version of the RSD model provides the model framework (Table 5), and the data from the Wolverhampton framework populates it.

The RSD Framework is a simple and practical tool that includes the process steps, and could be employed by teachers, parents and learners to illustrate development stages. However, in its current state it doesn’t identify and include specific digital literacy skills.

The Wolverhampton e-confident learner framework clearly identifies digital skills to be mastered, and what skills a learner at different key stages might display. However, in its current form it may be too complicated to be practically useful to teachers, parents and learners. It also doesn’t include the process steps associated with becoming information literate.

Alternatively the RSD Framework could be left blank, providing a template for students to insert examples of projects completed in which they showed these skills.

The easiest way to integrate a model into teaching practice would be to suggest that teachers and students use it during project work, where information-seeking is vital, and use of digital technologies to do so is likely.

If the model does include examples of digital literacy skills that should be mastered, it must avoid being too scripted and restrictive.

Models should be used with caution. Ideally they should act as a template through which to generate interest and discussion amongst practitioners, parents and learners. Evidence suggests that the process of discussing digital/information literacy amongst practitioners may be more important than the product (the model) produced.

Allowing practitioners to create their own interpretation is more likely to create a sense of ownership, and lead to staff engagement with digital literacy. The relative flexibility and customisation allowed by a combination of the RSD and Wolverhampton Frameworks may facilitate this.

A suggestion for just such a model is provided in Table 6 a & b. The two components of the suggested digital literacy model for use by learners and practitioners. Table 6a illustrates the digital skills components, Table 6b illustrates the critical thinking (information literacy) components. The digital skills components were taken from the Wolverhampton Model, and act as a reminder to practitioners and students as to the digital tools they could employ. The critical thinking table illustrates the questions that a practitioner should teach a learner to ask when completing a task.
### DIGITAL LITERACY DEVELOPMENTAL MODEL

#### DIGITAL SKILLS

<table>
<thead>
<tr>
<th></th>
<th>CLOSED ENQUIRY</th>
<th>OPEN ENQUIRY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Learner responds to practitioner-generated question</td>
<td>Learner defines own question</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>High-level of guidance</th>
<th>Low-level of guidance</th>
<th>No guidance</th>
<th>Structured guidelines</th>
<th>Self-determined guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>What digital tools are available? Which are best to answer your question? Do you have the necessary skills to use them?</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Access</td>
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<tr>
<td></td>
<td><strong>Access web-based learning module(s); complete effective searches on learning platform, restricted portal, or internet search engine. What are the e-safety issues?</strong></td>
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<td></td>
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</tr>
<tr>
<td>Understand &amp; evaluate</td>
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<tr>
<td></td>
<td><strong>Decide how to summarise and where to store your information (file storage, file types). Don’t just cut and paste!</strong></td>
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<tr>
<td>Create</td>
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<tr>
<td></td>
<td><strong>Create a presentation, digital image, podcast, video, web page, animation, game, or use desktop publishing software</strong></td>
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<tr>
<td>Communicate</td>
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<tr>
<td></td>
<td><strong>Present your talk, and discuss findings in person or via email, chatroom, blog, webcam, or social network. What are the e-safety issues?</strong></td>
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</tr>
</tbody>
</table>

#### CRITICAL THINKING SKILLS

<table>
<thead>
<tr>
<th></th>
<th>CLOSED ENQUIRY</th>
<th>OPEN ENQUIRY</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Learner responds to practitioner-generated question</td>
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<td>Define</td>
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<tr>
<td></td>
<td><strong>What is the question? What do you already know? What kind of information do you want to find? Who are your intended audience? Will you collaborate, and if so what’s your role in the team?</strong></td>
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<td></td>
</tr>
<tr>
<td>Access</td>
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</tr>
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<td></td>
<td><strong>What is the most appropriate place to start your search? How do you decide which is the most relevant information?</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Understand &amp; evaluate</td>
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<tr>
<td></td>
<td><strong>Summarise the information in your own words and your context. Can you trust the source? Have you cross-referenced with other sources? Do you need to go back to ACCESS?</strong></td>
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</tr>
<tr>
<td>Create</td>
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<tr>
<td></td>
<td><strong>Have you matched the format and design to your intended audience? Do you need to go back to ACCESS or UNDERSTAND?</strong></td>
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<td></td>
</tr>
<tr>
<td>Communicate</td>
<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Are you communicating at the right level for your audience? Are you using the information appropriately, using behaviour appropriate for our audience? What could you have done better?</strong></td>
<td></td>
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</tbody>
</table>

Table 6a & b. The two components of the suggested digital literacy model for use by learners and practitioners. Table 6a illustrates the digital skills components, Table 6b illustrates the critical thinking (information literacy) components.
5. EVOLVING FROM CURRENT PRACTICE

Q: How can we evolve from current practices in order to better include digital information literacy education?

The following answers to this question have been identified in the literature and by experts:

- We should involve parents.
- We should identify the appropriate pedagogical methods for teaching digital literacy, embed it within subject teaching, and monitor it in practice.
- We should incorporate digital literacy training, and methods of teaching it, into teacher training programmes and CPD.
- Information literacy should be taught in stages, in a continuous manner, within the curriculum, starting at primary school level.
- Teachers should be advised to ask open-ended questions, especially at preschool and primary levels.
- Recognition should be given to the importance of teacher and student motivation to develop information skills. This may require changes to the local environment, and the provision of support.
- Examples of how digital literacy education is incorporated into teaching should be collected, studied, and passed to other teachers.
- The role of the teacher and the school librarian in teaching digital literacy should be formalised.
- There should be a new approach to teaching project work which involves learning digital literacy skills. This should be founded on relevant research and good practice. Organisations like Becta should provide guidelines.
- A blueprint for how to best integrate digital literacy education within project work in secondary schools is provided.
- Allow a school and its staff to create and agree on their own strategy for including digital literacy training, and infuse this into all subjects.
- Provide overarching strategic policies at Government level which recognises information literacy skills in a digital world.
- Use exemplars of good practice to demonstrate the benefits.
- Promote and support the identified enablers to enable all practitioners not just teachers and or IT professionals to be involved in digital / information literacy education.
- Provide teacher training (initial and CPD) so that teachers have a knowledge and understanding of what information literacy skills are and how they can be incorporated / used in their teaching practice.
Create a sharing environment – resources, networks e.g. GLOW, GLOW Mentors; best / good practice e.g. LTS Curriculum for Excellence sharing practice website http://www.ltscotland.org.uk/curriculumforexcellence/sharingpractice/index.asp
6. RECOMMENDATIONS

Q: What recommendations can be given to learners, parents, learning providers and intermediaries (e.g. LAs) to assist the embedding of digital information literacy education into their current processes?

The following recommendations have been provided from Duncan Grey (Information Literacy Consultant) and the UK Literary Association:

- Acknowledge that information and digital literacy skills are an essential part of all our lives (as learners, consumers and as citizens).
- Acknowledge that information and digital literacy skills will enable life-time learning, improve our ability to make choices and to benefit from an information rich society.
- Policy makers, teachers, and parents should accept that playing computer games, joining virtual worlds etc gives children knowledge, understandings and enjoyment of digital worlds, and may add to digital literacy when these experiences are converted into useful knowledge in another context.
- Work with children to establish safe boundaries for internet use.
- Accept that digital technologies are no longer an ‘add-on’ and are an embedded part of culture and society.
- Accept that it is no longer a privilege but a right to be given the capacity to develop digital literacy skills so that pupils can participate in our evolving society.
- Reflect the importance of digital literacy skills in the National Curriculum.
- Expect teachers to actively introduce the opportunities to explore ways in which technology can enhance learning whilst being aware of individual children’s differing starting points (hence why a suitable developmental model to identify this would be useful).
- Digital information literacy needs to be seen as an integral part of cross-curricular activities and not a separate ‘bolt-on’ that consists of de-contextualised activities i.e. learning to undertake a Google search as a distinct task.

From this research come the following recommendations:

- Promote the evidence that digital literacy and independent learning skills are the gateway to employability.
- Promote change in the National Curriculum to reflect digital literacy skills and the importance of practising ‘the journey to information’ as much as ‘finding the correct answer’.
- Becta should agree on a set of skills associated with digital literacy that fall within their remit, for example: “assisting young people in effectively defining the problem, accessing, understanding, creating and communicating information whilst using digital technologies”
• Becta should agree to use terminology that engages their audience. The terminology involved in this field of study is confusing, for example digital literacy and media literacy are sometimes used to mean the same thing. Becta need to discuss possible terminology with stakeholders in order to find the most appropriate language to engage practitioners, learners and parents. (e.g. Do stakeholders consider ‘media literacy’ to include internet use? )

• We suggest that Becta use the term ‘digital literacy’ where necessary, but follow it up immediately with the explanation that in their context (learning through problem- or project-based tasks in school) this relates to digital and critical thinking skills.

• The model (Error! Reference source not found. a&b) should be shown to stakeholders in order to ather their thoughts, and discuss potential integration into the curriculum.

• The findings of this review should be publicised. It brings together research findings from the often-separate fields of media literacy, digital literacy, and information literacy, and the research groups associated with Library and Information Services, and educational research.

• Primary research is required to identify current digital literacy skills in our young people. Research is soon to begin on a project that aims to catalogue media literacy competency in primary and secondary schools. This work will be completed by Prof. David Buckingham at the Youth and Media Institute of Education, University of London. It may be worth asking Buckingham’s team to incorporate some of the aspects of this review into the project, if possible and where relevant.

• Practitioners should be asked to use the model to assist them, for example, in a minimum of one project per subject per academic year, and to try to move across the model (allowing more independent learning) where possible.
7. DEMAND-LED INFLUENCE

Q: Is there any evidence of parent and/or learner demand-led influences that have increased the effectiveness of Digital Information Literacy advice?

The only evidence found for a demand for better digital/information literacy education comes from Smith & Hepworth’s (2007) research. This showed that, where information literacy training does occur in secondary schools, it is patchy and taught in isolation of the context of project work (which is an ideal context in which digital literacy should be taught). Students expressed a desire to be taught skills whilst doing research work, but this wasn’t being fulfilled.

Grey (pers. com.) suggested that the lack of demand influence may well be because these skills are not acknowledged as important until after a child leaves full-time education:

[There is] staggering little [evidence], perhaps because the need is not appreciated until one has left school?

Duncan Grey, Information Literacy consultant and author, pers. com.

Walker (pers. com) suggests that the lack of demand influence from parents may well be due to their immature digital literacy skills:

Parents generally rely on gut feeling when looking at websites to make a decision – regardless of the backgrounds. People get by and use multiple factors to base their assessment rather than purely rely on what we might call information literacy skills.

Christopher Walker, Preschool Information Literacy expert, pers. com.
8. POOR DIGITAL LITERACY SKILLS IN TODAY’S YOUNG PEOPLE

Q: What evidence is there to support claims for a need for better Digital Information Literacy education?

There is a wealth of evidence to illustrate the poor digital and information literacy skills present in today’s young people. The following bullets summarise supporting evidence from the research base:

- A number of studies have shown that access and use of ICT differs in relation to gender, ethnicity, income and age. This access gap may well have changed to a fluency gap – even when everyone can access ICT it is likely that only a small proportion can use it fluently.

- The internet has replaced the library as the primary research tool for teenagers, but there is a large gap between the perception and reality of students’ digital literacy. This suggests that many leave compulsory education without the ICT skills necessary to be successful at Higher Education or in the workplace.

- Despite over 70% of US High School students saying they had completed at least one ICT course, they scored only slightly above the national midpoint on the ICT Literacy assessment. This suggests both that students need more digital literacy training, and that what is taught in ICT courses doesn’t include ICT literacy skills.

- Although the internet is almost omnipresent in many children’s lives, most children lack adequate Web searching, processing and evaluation skills.

- Most children lack adequate digital literacy skills, and as a result their confident Web searches usually lead to insufficient knowledge, understanding, and insight.

- Most 10 year olds appear to be inconsistent Web users who do not always act on their knowledge of Web searching and reading skills. Most show little planning behaviour before or during Web searches. Most avoid navigating deeply into websites.

- US High school students know that the Web is a good place to find current information, and they tend to trust institutional websites. They show some positive digital literacy skills, but tend to use search engines and domain extensions (e.g. ‘.com’) to authenticate websites and were unsure how to tell the difference between good and bad information. Students need training about when to use and when to avoid the Web to assist their studies.

- Children encounter problems in retrieving information and revising search strategies due to immature problem-solving skills, limited vocabulary and subject knowledge, and incomplete conceptual models of the internet. Curriculum constraints and teachers’ lack of experience are also contributory factors.

- It is dangerous to consider today’s children to be digital natives. We are all the Google generation, young and old. A fundamental shift in the way people seek and read information has already occurred and the impact of this has yet to be understood by information providers and educators (although you can bet Google already has a handle on it!).

- UK secondary students generally don’t have good breadth of information literacy skills. Most felt their skills were not well developed, and they didn’t feel confident in completing projects successfully. They felt inadequately trained to find information both in the library and online, and felt frustrated with the
time they spent searching. They lost interest if they reached a point where they didn’t know what to do next.

- Children, teenagers and adults have trouble with specifying search terms, judging search results and judging source and information. Regulating the search process is also problematic. Children, teenagers and adults become better searchers when they orientate, test, monitor, steer and evaluate during the ongoing process.

- Children have basic knowledge to allow them to access the Web, but not the cognitive maturity to evaluate the information there. In contrast many senior citizens don’t know how to use the internet but, given access, have the higher-order thinking skills allowing them to interact effectively online.

- Age and experience contribute to the development of higher-order thinking skills, which contribute to the development of functional internet literacy.

- First year university students show a wide variation in digital literacy skills beyond practical use of computers, mobile phones and email. This suggests it is dangerous to assume that being a member of the ‘Net Generation’ is synonymous with knowing how to employ technology strategically to optimise learning.

- A British Library and JISC report, based on an extensive literature review, identified the following:
  - Much of the impact of ICT on children has been overestimated
  - Although young people demonstrate confidence with computers, they rely heavily on search engines, view rather than read and do not possess the critical and analytical skills to assess the information found online
  - Many of the claims made on behalf of the Google generation in the popular media fail to stack up fully against the evidence.
  - A summary of these claims, together with the verdict (based on evidence) as to whether or not they are true is shown in Table 7.
<table>
<thead>
<tr>
<th>Common claims about the ‘Google generation’</th>
<th>Evidence suggests...</th>
</tr>
</thead>
<tbody>
<tr>
<td>They prefer visual information over text</td>
<td>True</td>
</tr>
<tr>
<td>They are the “cut-and-paste” generation</td>
<td>True</td>
</tr>
<tr>
<td>They do not respect intellectual property</td>
<td>Partially true</td>
</tr>
<tr>
<td>They are format agnostic</td>
<td>Partially true</td>
</tr>
<tr>
<td>They are more competent with technology</td>
<td>Generally true</td>
</tr>
<tr>
<td>They prefer interactive systems and are turning away from being passive consumers of information</td>
<td>Generally true</td>
</tr>
<tr>
<td>They have high expectations of ICTs</td>
<td>Probably true</td>
</tr>
<tr>
<td>They have shifted decisively to digital forms of communication: texting rather than talking</td>
<td>Unsure</td>
</tr>
<tr>
<td>They multitask in all areas of their lives</td>
<td>Unsure</td>
</tr>
<tr>
<td>They think everything is on the web (and it’s all free)</td>
<td>Unsure</td>
</tr>
<tr>
<td>They are used to being entertained and now expect this of their formal learning experience at university</td>
<td>Unsure</td>
</tr>
<tr>
<td>They have zero tolerance for delay and their information needs must be fulfilled immediately</td>
<td>False</td>
</tr>
<tr>
<td>They need to feel constantly connected to the web</td>
<td>Individuality, personality and background are more important than generation.</td>
</tr>
<tr>
<td>They find their peers more credible as information sources than authority figures</td>
<td>Probably false</td>
</tr>
<tr>
<td>They pick up computer skills by trial-and-error</td>
<td>False</td>
</tr>
<tr>
<td>They prefer quick information in the form of easily digested chunks, rather than full text</td>
<td>False</td>
</tr>
<tr>
<td>They are expert searchers</td>
<td>False</td>
</tr>
</tbody>
</table>

Table 7. Common claims about the Google generation, and the conclusion as to whether evidence supports it. Taken from Rowlands_et_al_2008_UK
9. DIGITAL LITERACY AND LEARNING PLATFORMS

Q: What recommendations can be given in terms of use of technologies that allow learner access any place any time (e.g. learning platforms, e-portfolios)?

There is no evidence to directly answer this question. However, if we are discussing digital literacy as skills relating to defining, accessing, understanding, creating and communicating information then learning platforms must support and facilitate these stages. From the evidence that is available:

- Learning platforms can be very effective when children are given the opportunity to design and shape them. Children need to be taught how to access such platforms outside of school, so they are confident to engage with them. The use of learning platforms should be innovative, imaginative and tailored to the needs and interests of the children and the school.

- Teaching students about a learning platform requires us to teach them from it, and investigate the raw material of content as well as just accessing it when trying to answer questions.

- The National Scottish Schools Intranet - GLOW – provides a useful case study. It has been designed to support the new Scottish Curriculum for Excellence. See http://www.ltscotland.org.uk/glowscotland/

- For older children and adults, information literacy models may need to evolve to include a greater emphasis on content management within large VLEs or digital libraries, and a strand designed to furnish students with basic metadata orientation. Understanding the concept of metadata would provide users both with skills to succeed when using VLEs/digital libraries, and with wider skills regarding how to improve their search strategies in all online information environments.

10. CURRENT DIGITAL LITERACY ADVICE

Q: What advice about digital information literacy is currently (or soon to) influence learners, parents and teachers? Is there any conflict in advice?

There is no evidence regarding new advice for learners, parents and teachers about digital literacy. The UK Literacy Association confirms that is a distinct lack of guidance for teachers, parents and learners about digital literacy at the current time, although there is a growing range of support for Higher Education learners.

Duncan Grey, an Information Literacy consultant, notes a potential conflict in the advice given to parents about internet filtering systems. He notes that whilst these might prevent children from accessing the wrong sorts of information in the short term, it doesn’t provide them with the strategies to manage the internet in their own time, or in the longer term.
11. CURRICULUM EXPECTATIONS

Q: What are the existing curriculum expectations for preschool and each Key Stage (1-4)?

This is summarised in more detail in Part B, the catalogue of evidence. Whilst certain critical skills are mentioned in the secondary curriculum, there is no coordinated method of integrating ICT and critical thinking throughout all subjects. Media literacy is mentioned in media studies, and some digital literacy issues are covered in ICT.

The most appropriate mapping of individual subject-based curriculum to information skills is provided in chapter 2 of Duncan Grey’s book Getting the Buggers to find out. This describes:

- The National Curriculum KS2 Information Skills opportunities for each subject, with suggested examples
- The National Curriculum KS2 Information Skills opportunities for each subject, with suggested examples
- The research and study skills strand of the English National Literacy Strategy for KS3
- Curriculum activities using information literacy

12. MODELS AND SUSTAINABILITY

Q: Can a developmental model of Digital Information Literacy be sustainable in the face of rapidly changing technology?

A model is only useful if it is practically of use, ideally to teachers, learners and parents. The evidence suggests that, so long as a model provides a practical framework that is adaptable to context, and avoids being too restrictive or dictatorial, it will be both usable, and sustainable in the face of changes to technology.

A model is likely to only be directly relevant during formal, task-based activities directed by a practitioner. Evidence suggests this is the best way to initially learn complex skills such as those associated with the full spectrum of digital literacy.

However, it is important to remember that a model is unlikely to describe a route to develop digital literacy when related to informal, unstructured, exploratory search behaviours associated with using ICT outside of the classroom. In this context, a model can only describe what behaviours are likely to be present in a child at a certain level, without any indication of ‘how to get there’ or ‘how to develop them’.
13. FURTHER RESEARCH
Q: What areas are lacking in evidence, and require more field research?

The following suggestions for future research have been identified in the literature and by experts:

- Methods of creating better instructional support so as to teach information and problem solving skills to students.
- Effects of different instructional methods (e.g. impact of collaborative learning on success of information seeking tasks).
- How primary children cope with the process of writing on computers, and how this impacts on their digital literacy skills.
- How well primary children extract information when faced with a combination of visual, verbal and written information available on web pages.
- Focus not only on children’s information seeking behaviours, but also on the prior phase of planning the search, and the subsequent phases of processing, evaluating and presenting. These data should be evaluated in terms of how these phases create meaningful learning experiences.
- How information literacy is conceptualised in different contexts, and what commonalities and differences result in these differing experiences.
- How formal information literacy training enhances learning, and assists people when they are outside of formal education environments.
- A well-funded programme of research and inquiry into the current information and digital literacy skills of young people.
- Identification of what enables some students to engage with information more readily than others.
- Investigation of the relationship between the development of information literacy skills and individual subject disciplines.
- Investigation into the relationship between handling information and the type of teaching that creates digitally literate students capable of independent learning.
- How can teachers be helped to engage in a debate about information and digital literacy?
- More research on the influence of certain types of media, such as radio, mobile phones and online gaming.
- More research on the impact of media on younger children, those with disabilities and ethnic minority groups.
- More research about the media literacy ‘creation’ area – how are young people using media to create, and what impact does this have, and what demands does this create for new media literacy education requirements?
• Reviewing the lessons learned in Higher Education for comparison with the schools sector.

• More sharing of research findings between academic and industry researchers.

• More observational studies that explore how media literacy is used in everyday life.

• Develop approaches to assessing the effectiveness of media education in influencing media use outside of the classroom.

The End

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