THE
**ROBERT GORDON UNIVERSITY**
ABERDEEN

# INFORMATION LITERACY IN THE CLASSROOM: SECONDARY SCHOOL TEACHERS' CONCEPTIONS

---

Final report on research funded by
SOCIETY FOR EDUCATIONAL STUDIES

By
**Professor Dorothy A. Williams & Caroline Wavell**
2006

Research Report 15
Department of Information Management
*(formerly the School of Information and Media)*
**ABERDEEN BUSINESS SCHOOL**

# INFORMATION LITERACY IN THE CLASSROOM: SECONDARY SCHOOL TEACHERS' CONCEPTIONS

Final report on research funded by

SOCIETY FOR EDUCATIONAL STUDIES

By
**Professor Dorothy A. Williams & Caroline Wavell**
**2006**

Research Report 15
Department of Information Management
(Formerly the School of Information and Media)
Aberdeen Business School
THE ROBERT GORDON UNIVERSITY

# ABSTRACT

The study reported here was designed to investigate how secondary school teachers describe their students' information literacy. It sought to identify how information literacy is interpreted by teachers in relation to the learning tasks they design, monitor and assess, and the issues related to its integration into the curriculum. In addition the researchers were interested in whether teachers' conceptions changed after a period of reflection and discussion with colleagues and how teachers' and information professionals' understanding and interpretation of information literacy compare.

Data was collected in three stages. Teachers' initial conceptions of information literacy were gathered from free-flowing group discussions. Teachers were invited to reflect on their practice, to observe their students working with information and consider this in relation to information literacy models, frameworks and research currently available. A second round of group discussions and interviews were conducted after this period of reflection. Teachers were invited to discuss quite freely how information literacy is incorporated into classroom activities, what it contributes to learning and how it might be tracked over time. The two sets of group discussions were recorded and transcribed, and these formed the basis of data for qualitative analysis using a phenomenographic approach to establish a structure of conceptions and key elements associated with them.

The results identify six conceptions of students' information literacy: finding; linguistic understanding; making connections; practical skills; critical awareness of sources; and independent learning. These conceptions were influenced by: affective, cognitive and skills understanding and experiences students brought with them to a learning situation; the focus of individual activities; the priorities and sense of control teachers experience in the classroom; and external pressures experienced by teachers. While sharing similarities with frameworks proposed by the information profession, they also reveal distinct differences. Teachers' conceptions of student information literacy did not change significantly between the two group discussions but the manner in which individual teachers reacted to their own observations and current research reflected personal characteristics and experience.

The results of the study indicate that teachers understood information literacy to be important for lifelong learning but do not feel able to effectively support the development of information literacy in their students within their current curriculum environments. The study identified issues for consideration when establishing effective collaborative partnerships within schools.

## AUTHORS

***Dorothy Williams*** is Professor in the Department of Information Management. Her main research interest focuses on the nature and impact of the human-information interaction. This research follows on from a number of studies she has conducted into the use and impact of information in relation to teaching and learning in schools.

***Caroline Wavell*** is Research Assistant in the Department of Information Management who carried out the day-to-day data collection and analysis of the study. She has worked on a number of research projects led by Professor Dorothy Williams. Her main interest lies in the nature of learning in formal and informal environments.

## ACKNOWLEDGEMENTS

The project team are very grateful to all those who contributed to this research project.

In particular we would like to thank the participating teachers who gave up their own time to talk to us and to their schools for supporting their involvement. In addition, we would like to thank members of the advisory group for their interest and support.

We also thank the Society for Educational Studies for providing the funding that allowed us to conduct the study and emphasise that this report represents the views of the authors and not necessarily those of the funding body.

# CONTENTS

ABSTRACT ..... i
AUTHORS ..... ii
ACKNOWLEDGEMENTS ..... ii
CONTENTS ..... iii
LIST OF TABLES ..... iv
EXECUTIVE SUMMARY ..... v
1 INTRODUCTION ..... 1
2 BACKGROUND ..... 5
2.1 Information literacy in theory and practice ..... 5
2.2 Recent information literacy research ..... 6
2.3 Information literacy and current educational priorities ..... 7
3 METHODOLOGY ..... 9
3.1 Introduction - planned data collection ..... 9
3.2 Recruitment of participants ..... 10
3.3 First group discussion ..... 11
3.4 Practice-based reflection ..... 13
3.5 Maintaining Contact ..... 14
3.6 Second Group Discussions ..... 14
3.7 Data analysis ..... 15
3.8 Overview of participants ..... 16
3.9 Evaluation of data quality ..... 18
4 FINDINGS ..... 19
4.1 Introduction ..... 19
4.2 Conceptions of information literacy ..... 19
4.3 Contribution to learning ..... 25
4.4 Information literacy and student context ..... 28
4.5 Information literacy and teacher context ..... 29
4.6 Information literacy and educational context ..... 38
4.7 Summary ..... 41
5 DISCUSSION ..... 43
5.1 Comparison of teachers' conceptions with existing models ..... 43
5.2 Information Literacy and Learning ..... 51
5.3 Summary ..... 56
6 CONCLUSION ..... 59
6.1 Review of project as whole ..... 59
6.2 Review of the findings ..... 59
REFERENCES ..... 63
APPENDICES ..... 69
Appendix A: Participation Agreement ..... 71
Appendix B: Information Related Activities Grid ..... 75
Appendix C: Suggestions for a Reflective Observation Log ..... 79
Appendix D: Summary of Information Literacy given to participants ..... 83
Appendix E: Examples of Information Skills ..... 89
Appendix F: Example of a Reflective Observation Log ..... 93
Appendix G: Examples of Information-related Activities ..... 99
Appendix H: Comparison of Curriculum Stages in School Education ..... 105
Appendix I: Comparison of Information Literacy Frameworks ..... 109
Appendix J: Summary of Dissemination Event ..... 113

# LIST OF TABLES

Table 1: Numbers of participants at each phase of the data collection ..... 17
Table 2: Breakdown of Teacher Participants by Subject Discipline..... 17
Table 3: Summary of Teachers' Conceptions of Student Information Literacy ..... 20
Table 4: Dimensions of variation of teachers' conceptions of student information literacy ..... 42

# EXECUTIVE SUMMARY

## Aims of the study

This report presents findings from a recent study investigating secondary school teachers' understanding of the term information literacy and its relationship with learning. Schools have increasing expectations, and provide increasing opportunities, for learners to engage with a wide variety of information environments. Previous definitions and models of information literacy have attempted to describe effective information use within a learning context from the perspective of the information profession. However, we know little about the teacher's perspective. This study sought to understand:

- How teachers conceptualise information literacy and issues relating to its integration into the curriculum.
- How information literacy is interpreted by teachers in relation to the learning tasks they design, monitor and assess.
- Whether teachers' conceptions and understanding of information literacy change after a period of reflection and discussion with colleagues.
- How teachers' and information professionals' understanding and interpretation of information literacy compare.

## Methodology

The study was designed to be practitioner-centred, focusing on curriculum-based information activities and the learning process from the teacher perspective. Data was collected through a series of group and individual discussions and interviews with subject teachers.

- The first round of discussions, lasting approximately one hour each, gathered teachers' initial conceptions of the term information literacy.
- Teachers were then invited to observe their students working with information and to reflect on their observations in relation to evidence from current information literacy research.
- A further round of group discussions with the same teachers gathered additional views and conceptions after a period of reflection.

The study was funded by the Society for Educational Studies and was undertaken between 2004 and 2005.

## Findings

### *Conceptions of information literacy*

Teachers participating in the study represented a wide cross-section of subject departments. Although some participants tended to emphasise one particular aspect of information literacy, reflecting their specific context, most individuals expressed a number of different conceptions. The collective conceptions are outlined below and described as:

- *Finding information conception* – with an emphasis on gathering information, mainly facts, using technology and the school library, and the need for

students to be able to navigate different sources, such as websites, books, the library.

- *Linguistic understanding conception* – basic comprehension of textual or verbal information, including instructions for a particular activity, relying to an extent on general knowledge and prior experiences in similar activities.
- *Making meaning conception* – cognitive processes, for example summarising, synthesising, interpreting, decision-making, which make sense of, or derive meaning from, information in different sources and formats within the context of the specific subject under consideration.
- *Skills conception* – practical ability to apply effectively a wide variety of skills, techniques and strategies required for handling information, including traditional library and information skills and more cognitive skills required for making meaning and evaluating and reflecting on decisions.
- *Critical awareness of sources conception* – focusing on the need to evaluate sources, recognise bias, determine the quality of the information and check the authority of a website.
- *Independent learning conception* – the ability to confidently make decisions in order to assess, select and apply relevant skills and strategies for current purpose in and in a variety of situations, in order to learning independently, with less reliance on teacher input.

In comparison with existing models and frameworks, these conceptions tend to give more emphasis to basic linguistic understanding and making meaning from new information. Conversely all other models and frameworks place importance on defining the information need, and some also emphasise building and disseminating new knowledge and ethical issues associated with information literacy.

While not specifically identified as conceptions, teachers described the contribution information literacy makes to learning as: confidence building and positive attitude to learning; and this is closely related to the ability to handle information efficiently through the application of skills; achievement and lifelong learning; and new and greater knowledge.

### *Information literacy and learning*

Teachers described information literacy in relation to the student context, and suggested that some students have the ability to see connections and develop the skills required to be information literate more naturally than others. These students were considered to be motivated to learn, to be competent readers, to have an enquiring mind, good general knowledge, support from home and have achieved the appropriate developmental stage earlier. Teachers also recognised that many students lack skills to find and use information and were not confident that they knew how they could influence the development of information literacy.

Teachers described information literacy in relation to their own professional experiences and priorities. While they accepted that information literacy is embedded within the curriculum, there was also a sense that for many teachers information literacy was considered as cross-curriculum skills building, separate from their subject rather than a way of learning and teaching. Although some teachers began to question assumptions they made of students' abilities to handle information tasks effectively, few had explored in any depth students' use of information in relation to the tasks set and mediation given. A few teachers identified ways in which they could tackle aspects of information literacy that were of immediate concern and make positive changes to student learning. However, direct observation and monitoring of skills development and mediation within the process appeared to present challenges for the majority of teachers in terms of time

and flexibility in the curriculum, and this acts as a barrier to their own professional learning.

The current educational context was seen as a further barrier to information literacy development. Teachers felt constrained by overloaded curriculum content, with timetables too tight to allow time for information literacy skills development. They felt pressured by formulaic structures for exams and were reluctant to take risks that would they would not be able to justify in terms of assessment grades.

Teachers appreciated the opportunity to discuss and reflect on information literacy and recognised the complexity of the cognitive processes behind information literacy. The majority saw information literacy as requiring further dialogue and support from the whole school community but were conscious of the difficulties in discussing, reflecting and implementing whole-school initiatives.

### *The way forward*

The study suggests that greater dialogue within school communities could help teachers develop a shared understanding of information literacy as a whole, for example: the relationship of information literacy and learning within the curriculum as a whole; the balance between different information outcomes in terms of skills development, knowledge building and generation, and social and ethical issues related to information use.

Strategies could be considered to enhance mediation of the information process for students, for example: clarity of learning objectives in information activities; ensuring that students understand and fulfil teacher expectations; taking account of prior knowledge and student understanding when presenting activities; ensuring that students understand how information is organised and presented in various physical and virtual environments, and the importance of developing the practical skills and cognitive abilities to use information effectively.

The study contributes to the debate about inter-professional collaboration between teachers and school librarians in the development of information literacy. It identifies the need for greater collaborative learning through ongoing dialogue and debate to examine common and complementary goals and strategies for information literacy development within the curriculum as a whole. During that debate librarians can play a role in supporting professional development but need to avoid overemphasis on specific models which may not accommodate the priorities of individual school communities. Both professions need to consider information literacy in relation to learning rather than focussing on mechanistic skills development, if they are to prepare students for lifelong and independent learning beyond the school environment.

# 1 INTRODUCTION

This report describes research carried out with secondary school teachers to elicit their conceptions of information literacy in relation to their classroom practice. The study was funded by the Society for Educational Studies and was undertaken between 2004 and 2005.

Information literacy is the term used to describe the ability to find and use information effectively in relation to need and purpose. It has been variously defined as the ability to:

- *"...recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information"* (Breivik, 1989);
- *"...identify, locate, evaluate, organize and effectively use information to address issues or problems at hand that face individuals, communities, and nations."* (Thompson, 2003); and
- *"...knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner"* (CILIP, 2004).

Having the capability to find and use information is central to learning in any context. There is now a widespread recognition of the need to prepare learners for an environment in which knowledge is highly contextualised, rapidly changing, more diverse than ever before (Australian Council of Deans of Education, 2001). In their analysis of the issues of assessing the literacies required for today's learners, Kalantzis et al. consider that *"good learners will be broadly knowledgeable, and in particular able to engage with the different interpretive frameworks and contexts of specific information"* (Kalantzis, Cope, & Harvey, 2003). These are seen as the abilities needed to enable learners to continue to learn throughout their life.

School education has been under significant pressure in recent years to ensure that all students regardless of cultural, ethnic, physical or mental status are given the same opportunities to become lifelong learners and participating citizens. Increased access to ICT, in particular the Internet and World Wide Web, has heightened awareness of information as both solution and problem. The increased opportunities the Internet provides for learning, making more informed decisions or communicating with others, can be seen alongside the challenges of judging the quality and trustworthiness of information, or dealing with information overload.

While improvements in the user-friendly design of information systems may offer partial solutions, meaningful engagement with information goes beyond the ability to use ICT. There is a growing body of research which has focused more directly on the experiences of the information user and information seeking behaviour. This research provides important insights into the complex relationship between information and effective knowledge building and decision-making, and emphasises the fact that the impact of ICT on social inclusion, citizenship, and lifelong learning is dependent on the ability of individuals, communities and organisations to engage with information as much as with the technology.

Despite the apparent widespread acknowledgement that information literacy is important in lifelong learning, there is much less clarity on whether or how this can be achieved in formal education. The development of information literacy has long been of concern to the information and library profession, particularly school, college and university librarians. Many of the models of information literacy which

have been developed have been used by library and information professionals to provide structure in library-led information skills programmes in schools and HE. However, they express ongoing concern about what is perceived as a lack of formal recognition given to information literacy compared with ICT skills in the curriculum; and a frustration that there is not more inter-professional collaboration between librarians and teachers in developing information literacy as an integral aspect of learning to learn. While the term may not be used, aspects of information literacy as understood by the information profession are embedded in school curricula. Yet recent research by Williams and Wavell (2001) highlighted the difficulty expressed by secondary school teachers and librarians of identifying in any depth the expected contribution of curriculum-based information activities to learning.

Much of the research in this field has been focused on, initiated by and/or led by the information profession. It may be for this reason that we know much more about the school library and school librarian perspective than we do about the teacher perspective on information literacy. It is not clear how teachers' perceptions of what makes an "information literate learner" compare with the information profession's models or how teachers' perceive information literacy to stand within the various priorities and demands that exist within the current educational environment.

This research aimed to address some of these gaps in our understanding of the apparent challenges of developing information literacy within the curriculum by looking at information literacy through the eyes of teachers. The research examined secondary school teachers' understanding of the term information literacy and its relationship with learning. More specifically the study sought to identify:

- how teachers conceptualise information literacy and issues relating to its integration into the curriculum;
- how information literacy is interpreted by teachers in relation to the learning tasks they design, monitor and assess;
- whether teachers' conceptions and understanding of information literacy change after a period of reflection and discussion with colleagues;
- how teachers' and information professionals' understanding and interpretation of information literacy compare.

The phenomenographic study was designed to be practitioner-centred, focusing on teachers' varying conceptions of information literacy in the context of current curricula and the learning process. The findings should provide a clearer picture of the differing perspectives of information literacy in schools and a greater understanding of the challenges of developing and reinforcing information literacy within the curriculum. In turn this should be helpful in developing more effective inter-professional collaboration in support of the learning experience and student achievement.

The report describes in greater detail:

- the background and context within which the study was undertaken (section 2);
- the methodology and methods used (section 3);
- the findings, with qualitative evidence, describing teachers' conceptions of information literacy in relation to their classroom practice in terms of learning and the curriculum, what they do and the issues they encounter (section 4);
- the interpretation, significance and implication of findings in relation to the development of information literacy by teachers and librarians, classroom

practice and professional learning (sections 5);
- overall conclusions (section 6).

# 2 BACKGROUND

## 2.1 Information literacy in theory and practice

Information literacy as a term has been in our vocabulary for many years. Traditional definitions describe information literacy in terms of the information process of finding, using and thinking about information. For example, '*To be information literate is to recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information*' (Breivik, 1989). Further definitions have expanded on the theme, broadening the scope '*...to address issues or problems at hand that face individuals, communities, and nations*' (Thompson, 2003, p3); '*...knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner'* (CILIP, 2004) and as *'a new liberal art that extends from knowing how to use computers and access information to critical reflection on the nature of information itself, its technical infrastructure, and its social, cultural and even philosophical context and impact'* (Shapiro & Hughes, 1996).

Early definitions led to the identification of a list of attributes or competencies an information literate person is thought to exhibit, for example an information literate individual requires an understanding of:

- *A need for information*
- *The resources available*
- *How to find information*
- *The need to evaluate results*
- *How to work with or exploit results*
- *Ethics and responsibility of use*
- *How to communicate or share findings*
- *How to manage findings.* (CILIP, 2004)

Attributes have been further broken down into specific skills developed into frameworks which, in the USA and Australia in particular, are detailed in relation to teaching and learning within the curriculum (AASL & AECT, 1998; Bundy, 2004). Although useful for illustrating the breadth and type of capabilities required, these lists of competencies have the potential danger of suggesting that proficiency automatically leads to information literacy. In contrast other research into information literacy has described the complex mix of skills, knowledge, attitudes and experiences associated with the use of information from the user perspective (Bruce, 1997, Kuhlthau, 2004; Shapiro & Hughes, 1996). These descriptions reveal the complexity of the information process, a cyclical and iterative process rather than linear process, and suggest caution in the use of defined sets of learner attributes. Indeed, Bates, at an early date, when describing the berrypicking techniques of searching online, recognised and illustrated the information process as an erratic journey without neat boundaries (Bates, 1989). Bruce's research (1997) also reveals the multiple conceptions of the nature of information literacy which can be held by information users in relation to different tasks. Lemke, writing from a context of semiotics involved in literacies required for information technologies, echoes the work of Shapiro and Hughes (1996) in stressing the need to interpret information within the cultural traditions of specific subject disciplines in which it is placed (Lemke, 1996). Such studies emphasise the need for more effective pedagogies and curricula based on an understanding of the information user perspective and the relationship between information literacy and learning.

The need to be able to find, critically evaluate and apply information in learning and problem solving is clearly not new (Rogers, 1994) but the significance has increasingly been recognised in the context of ICT. The introduction of ICT in workplace, home and school has made information readily accessible but has also highlighted the significance of issues of quality, relevance and reliability of information, as well as the value of being able to deal effectively with the quantity of information and sources available. Thus information literacy can be seen to be directly relevant to learning and achievement both in education and in life, and information access and use is now seen as part of the foundation of lifelong learning.

Elements associated with information literacy are embedded in curriculum documentation, such as the use of a variety of sources, evaluating and interpreting information in diverse formats, and the integration of ICT into the curriculum has reinforced these messages. Over the years a number of information literacy models have been developed and have been used as learning and teaching aids in schools, for example: Becta Star (undated), Big 6™ (2001-5), Marland (1981), Moore (2002) models. The success of these models in developing students who leave school as information literate individuals has not been systematically evaluated and evidence from recent research would suggest that a number of other factors may be missing.

## 2.2 Recent information literacy research

Research which has highlighted issues associated with the development of information literacy within the curriculum has, to a large extent, been undertaken within a school library context. Findings have raised as many questions as they have answered in relation to issues such as task setting, teachers' approaches to information tasks, problems associated with monitoring and assessing skills development, and the nature of teacher and librarian interventions in the learning process. For example research into the impact of the school library on learning suggested a much greater emphasis on searching for information than on use of information, with fewer students, even in the upper school years, demonstrating understanding of how to evaluate and interpret information (Williams & Wavell, 2001). The prevalence of information gatherers, as opposed to users, has also been highlighted in a number of other studies (Burdick, 1996; Erdelez, 1997; Many, Fyfe, Lewis & Mitchell, 1996). The significance of the relationship between information searching and information use has also been examined in a number of research studies, including the significance of task complexity (e.g. Attfield, Blandford & Dowell, 2003; Bruce, 1997; Byström, 2000; Kuhlthau, 1997). Other studies consider perception and understanding of the task (Limberg, 1999; Merchant & Hepworth, 2002) especially when translated from teacher to student (Entwistle & Smith, 2002). The type of task set or the type of questions posed appears to be significant in determining the way information is handled, transferred or transformed (McKenzie, 2003; Schroeder & Zarinnia, 2000; Wavell, 2004), and the information users' prior knowledge either of the subject under investigation (Todd, 1997) or of the way information is catalogued and presented for use (Moore, 1995, 2000) also has a bearing on information handling.

The affective elements of information seeking has been the subject of Kuhlthau's research, in which each phase of the information cycle is linked to a particular affective mood, feeling, thought or action (Kuhlthau, 2004). Motivation is also considered a key element in effective information seeking behaviour (Burdick, 1996; Small, 1998a & b; Smith & Hepworth, 2005).

The Williams and Wavell (2001) study raised questions about the challenges teachers clearly felt when invited to interpret learning activities in relation to information handing, as well as the ability of librarians and teachers to diagnose information problems faced by learners and to intervene meaningfully to provide support. Kuhlthau examined the role librarians took when supporting information seeking and recognised the significance of levels of mediation and zones of intervention in determining meaningful information literacy experiences (Kuhlthau, 2004). Curriculum related information-based activities are often supported by both subject teacher and librarian, each with their own agendas in terms of learning but not always with a clear understanding either of each others' professional roles and expertise or how these might best be integrated for maximum benefit. Yet there is evidence that indicates the importance of this mutual understanding and collaboration for effective resource based learning and achievement (Lance, 1997; Webb & Doll, 1999). A better understanding of the way teachers conceptualise information literacy in relation to learning and problem solving, and how this in turn influences the learning environment and tasks they set, will therefore provide a stronger foundation not only for curricular development but also for the professional education of teachers and librarians.

Information literacy, as defined above, implies a confidence and ability to draw on a wide range of strategies at a variety of cognitive levels and an ability to be creative and flexible enough to adapt to ever changing contexts as well as the dynamic process of interpreting and transforming information into new knowledge. There are assumptions that by the time pupils leave school they should be independent users of information yet, while levels of IT skills are improving (Condie, Simpson, Payne & Gray, 2002; Harrison, et al, 2003) concern is increasingly raised about the need for improved information literacy amongst those entering higher education (Foresight ICM Panel, 2000) or workplace (e.g. Mutch, 1997; Abell & Ward, 2000; Donnelly & Craddock, 2002). It has also been shown that even apparently confident information users experience difficulties when using information in complex or new situations (Kuhlthau, 2004, Kuhlthau, 1997; Attfield, Blandford & Dowell, 2003).

Evidence suggests that teachers are not necessarily confident users of information themselves and tend to restrict their information resources to relatively few sources (Williams, McConnell & Wilson, 1997), particularly in unfamiliar situations (Williams & Coles, 2003). Yet they are required to develop strategies in their pupils to access, evaluate, synthesise and interpret information from a variety of resources and in a variety of formats. In addition, research indicates that teachers' own understanding of any concept, including information literacy, is fundamental to its effective delivery and development in students (Adey & Shayer, 1994; Sherin & Shulman, 2004; Merchant & Hepworth, 2002). The study reported here examined teachers' conceptualisation of information literacy in relation to professional classroom practice. It also examined what the issues are for teachers; how confident they feel about supporting information literacy through the curriculum; their delivery of information related tasks; and the support needed to encourage learning through information.

## 2.3 Information literacy and current educational priorities

The Government is continually making changes in education and the way the curriculum is delivered to ensure standards are maintained through the assessment and inspection processes. For example there have been recent moves to raise standards of learning and teaching by reviewing the curriculum in Scotland (The National Debate on Education). The resultant curriculum review aims to provide opportunities for every young person to become successful

learners, confident individuals, responsible citizens and effective contributors to society and work (Scottish Executive, 2004). While recognising that many of the approaches to fulfil this aim are already available it implies the need for a fresh look at the learning environment, its organisation and the approaches used. A number of positive moves are being seen, for example initiatives focusing on formative assessment, such as Learning and Teaching Scotland's 'Assessment is for Learning' programme, and research into the way individual subjects are taught, for example 'Cognitive Acceleration through Science Education' (CASE). Students are being encouraged to reflect on their own learning and to develop thinking skills, both of which have the potential to enhance the cognitive elements of learning. Information literacy could be seen as yet another initiative along these lines but clarification is needed to establish the extent to which it overlaps, conflicts with or complements these other areas of interest.

In addition, there has been increased awareness in recent years by HM Inspectorate of Education, in Scotland, and Ofsted and DfES, in England, of the role of the school library in supporting learning (HMIE, 2005; Ofsted, 2001; DfES, 2004). Alongside reader development, information literacy is a major role for the school librarian but, just as librarians need to understand literacy developments within the curriculum, they also need an understanding of how teachers support information literacy in the classroom, even if the professions do not use the same terminology.

The learning theory that underpins traditional views of information literacy in school libraries is constructivism (Kuhlthau, 1993). In exploring the affective dimensions of information seeking and the role school librarians might adopt to support the research process undertaken by novice information users, Kuhlthau (2004) builds on the work of Vygotsky and his zones of proximal development (Vygotsky, 1978). The significance of this research is the need to guide students to effective information literacy through appropriate and timely mediation and the need for librarians to be reflective practitioners in order to implement this mediation (Kuhlthau, 2004).

Meanwhile, teachers are also being encouraged to reflect on their approach to teaching and understanding of learning either by engaging with research or through more formal continuing professional development (CPD) activities, including the Chartered Teacher Programme in Scotland. Maclellan and Soden writing about the 'expert teacher' suggest that there is a lack of knowledge about learning theory, including constructivism, amongst the charter teacher candidates they examined (Maclellan & Soden, 2003). If information literacy from the information profession is founded upon constructivist models of learning but teachers are not necessarily practising constructivism, then this could lead to potential conflict in the way the two professions approach information literacy, particularly when attempting collaborative lessons. As already stated in section 2.2, successful mediation for transference or transformation of knowledge requires thorough understanding of the subject and its underlying principles by the mediator. In the case of information literacy the mediator may be a teacher, the school librarian or both.

# 3 METHODOLOGY

## 3.1 Introduction - planned data collection

The study was practitioner-centred, with participants focusing on and describing information-related tasks and the learning process from their own perspective as classroom teachers.

Essentially the study took a phenomenographic approach exploring the concept of information literacy, the characteristics of the phenomenon and factors associated with the phenomenon, from the perspective and experience of teachers. Phenomenography, developed in the field of educational research (Marton, 1981), sets out to describe the different understandings and experiences people have of a phenomenon. This approach focuses on differences in understanding and finding common elements or dimensions in which the phenomenon is described. Phenomenography has been extensively used in the study of learning (e.g. Franz, Ferreira & Thambiratam, 1997; Marton, 1981; Marton, 1988) and more recently has also been successfully used to explore conceptions and experiences of information literacy in an HE context (Bruce, 1997; Maybee, 2006). While most studies have tended to focus on the learner or academic's own experiences of information literacy, the present study focuses on teachers' experiences and conceptions of their students' abilities and their experiences and perceptions of their role in developing their students' abilities. In this sense the present study is closer in nature to Webber's ongoing research into academics' conceptions of information literacy (Webber & Johnston, 2005) or Brammer's work with registered nurses (Brammer, 2005, in press).

The data was collected in three stages:

- gathering teachers' initial conceptions of information literacy in group discussions;
- working with individual teachers in monitoring and reflecting on specific information-related curricular activities as they happen;
- gathering additional teacher views and conceptions in a second group discussion after a period of reflection on specific curriculum-based activities.

Semi-structured group discussions and activities with teachers have proved a successful means of gathering data on perceptions and personal experience in previous projects by the project leader, for example the impact of the school library on learning (Williams & Wavell, 2001) and teachers' use of research for professional practice (Williams & Coles, 2003). While phenomenographic studies often take an individual interview approach, it was considered more appropriate in this study to adopt a group approach in order to encourage practitioner-practitioner discussion, rather than practitioner-researcher dialogue. By offering opportunity for teachers to engage with the research themes through the discourse of their own profession, group sessions were more likely to a) enrich the findings by revealing differences and similarities, and developing strands which might otherwise have remained unexplored; b) provide a useful learning experience for the participants themselves; c) encourage participants to consider the issues further in their own classrooms. This was particularly important as the term 'information literacy' was likely to be unfamiliar to many teachers, although the need to develop skills required to use information is embedded in secondary curricula.

It was proposed that the study would be based around established groups of teachers (with an overall target of a minimum of 30 teachers) who already meet on a regular basis. By capitalising on meetings already planned the research sought to avoid some of the problems associated with identifying potential participants within schools and the challenges individuals have in allocating time to non-essential tasks, such as interviews with researchers. For logistical and economic reasons, it was planned to recruit groups from authorities within a 150 mile radius of the Robert Gordon University. As the research problem was not specific to one particular curriculum but centred on issues relating to learning in an information environment, the relevance and transferability of findings should not be adversely affected by these practical considerations.

The researchers planned to meet with teacher groups for approximately one hour at each discussion session. The purpose of the first meeting was to record initial perceptions of information literacy as a concept, which was likely to be a relatively new phenomenon for many. The second meeting was intended to capture conceptions and understanding of information literacy after a period of reflection by all participants on specific curriculum-based activities in their own classrooms.

The initial intention was to stimulate discussion in the second group sessions by inviting three individual teachers from each group to maintain a record of their own interim reflections and use this as a basis for reporting their own experiences to the group. In practice the groups were smaller in size than originally envisaged (see section 3.2) and so all teachers were encouraged to maintain an informal record of their reflection on information literacy in relation to the setting, managing and assessment of curriculum related tasks using a simple tool to prompt reflection (see Appendix C). Contact and motivation was maintained throughout this reflection period by means of a visit and telephone or email contact. In addition, an online discussion forum was set up to provide an opportunity for participant teachers to share views and experiences between meetings.

A small advisory group was established with three members representing a balance of research and practitioner expertise from both the education and information fields, and incorporating an international perspective. This was helpful in ensuring that the research methods were sound in theoretical and practical terms, and that the research activities and questions would be relevant to both professions.

## 3.2 Recruitment of participants

The research team were well aware of the difficulties of engaging busy teachers in research led by university academics. In an attempt to overcome some of these difficulties the plan was to work with groups of teachers who already meet as groups for curricular or career development purposes rather than attempt to identify individual teachers. The overall target was 30 teachers, spread over 3-4 groups. The following range of contacts were approached for advice in identifying possible teacher groups:

- National Grid for Learning Specialist, Development Officer for Citizenship, and Development Officer for ICT Masterclasses at Learning & Teaching Scotland for possible names of curriculum developers, Masterclass co-ordinators and citizenship initiative developers;
- Lecturers offering CPD courses in Aberdeen and Glasgow University

Faculties of Education;
- Directors of Education in Aberdeen City, Aberdeenshire, Angus, Edinburgh, Highland, and Moray local authorities.

While the initial responses were positive the follow-up activities and contacts with teachers resulted in only limited recruitment to the project. During these early discussions, it became apparent that the target groups of teachers were fully committed to other initiatives and, however keen, felt unwilling or unable to get involved in further external activities.

An alternative strategy of contacting head teachers directly proved more successful. Letters were sent to schools in ten local authorities. In addition, the help of school librarians across the UK was sought via a school librarian electronic discussion list. In total, letters and brief descriptions of the project were sent to 118 secondary schools in Scotland and five in England. Seventeen schools expressed an interest with teachers in nine schools eventually participating.

The total number of teachers involved was 31, with group sizes varying between 2 and 6, spread across eight local authorities: Aberdeen, Aberdeenshire, Edinburgh, Highland, North Lanarkshire, West Lothian, Kent and Staffordshire. Geographic and time constraints meant that two teachers who were keen to participate were unable to join others for group discussions. They were interviewed individually, covering the same themes as the discussion groups and provided useful data and insights which were incorporated into the analysis.

The process of identifying groups of teachers willing to participate and of organising group meetings was slower than anticipated and the tactic of using existing groups of teachers did not prove as successful as hoped. As a result of the larger number of groups but small group sizes and the need for shared experiences to guide the second round of group discussions, all participants were encouraged to keep records of their practice-based reflections rather than restricting this to a small proportion from each group.

## 3.3 First group discussion

The aim of the first round of group discussions was to establish teachers' initial conceptions of information literacy and issues relating to its integration into the curriculum.

Curriculum support co-ordinators in Aberdeen City Council acted as a pilot group for the first group discussion and this resulted in an interesting discussion of information literacy and classroom practice, and some of the issues arising from skills development. Useful feedback on the process of conducting the group sessions was also forthcoming from this group.

As a result of the pilot and consultation with key contacts and advisers, it was decided to place the emphasis of the discussion meetings on reflection and the sharing of insights and minimise references to research.

Summary of Protocol for First Group Discussion:

1. Brief introduction, emphasising what was involved, that the study was of mutual benefit and that our focus was on practice-based reflection and feedback.
2. Signing up to the project as part of our ethical procedures, ensuring participants were aware of what was involved (see Appendix A).

3. Completion of a grid (see Appendix B) to focus participants on information related tasks they undertake with pupils, followed by discussion.
4. Main discussion session, primed by short introduction raising questions.
5. Summary of the discussion and information about the next stage of the project.

At the start of each group discussion the researcher explained how the study would progress and what was involved for participants. The activities for the first meeting were then outlined. Each participant was asked to sign a form giving their informed consent, indicating that they understood the nature of the study and their own involvement, that the discussions would be recorded but that anonymity would be maintained, and that data would remain confidential and stored in accordance with the Data Protection Act 1998. This form also acted as a means of gathering basic information for contact purposes. The only demographic data sought for research purposes was the subject speciality of the group members.

After initial introductions and explanations, participants were given the opportunity to complete a grid of information-related activities they conduct with their pupils (see Appendix B). This was intended to help focus participants on specific examples in their own practice and provided the research team with a range of examples of information-related curriculum activities and teachers' perceptions of the skills, knowledge and understanding involved in achieving those activities.

The participants were then encouraged to talk quite freely about their conceptions of information literacy in relation to pupil learning. The following questions were posed at the beginning as a way of introducing themes for discussion. However, the discussion was free-flowing with the minimum of interruption by the researcher when it strayed too far from the central themes:

- What is your conception of information literacy? How does information literacy impact learning?
- How well does it work? i.e.:
  - What sort of things do learners cope with well?
  - What problems do learners experience/encounter in these tasks?
  - How could information literacy be improved?

By the end of the discussion teachers had:

- debated the nature of information literacy

and had provided data on:

- their views of the tasks and means by which learners find/receive and use information;
- strategies teachers use to develop their pupils' information literacy; and
- issues, both positive and negative, associated with information tasks.

It was also intended that the discussion would stimulate further reflection on what *actually* happens in their classrooms.

At the end of the session, the researchers:

- summarised the outcomes of the discussion;
- explained how the online discussion forum would be implemented and its role in maintaining the exchange of ideas between the groups and to

widen the experiences for reflection. (For research purposes, the discussion forum was also intended to be a means of maintaining motivation by keeping the discussion flowing.)
- encouraged participants to look more closely at an area of pupil learning where information literacy is proving challenging and to try out, and reflect on, alternative strategies; and
- reminded participants of the second group discussion which aimed to capture further conceptions of information literacy after a period of reflective practice.

In two schools, only one teacher expressed an interest in taking part in the study and these teachers were interviewed individually. The discussion was not as lively but their conceptions and experiences still provided valuable contributions to the data.

## 3.4 Practice-based reflection

The aim for the interim reflection phase was for teachers to look at their own practice, examine in depth information literacy in relation to pupil learning experiences, and to consider areas for improvement. All this was undertaken within their normal classroom routine.

Participants were asked to maintain a journal or log of their reflections to be shared with the research team. Participants were given guidance on maintaining a reflective log (see Appendix C), in which it was suggested that observation and reflection be based upon the key questions and grid used during the first group discussion, i.e.

- How does information literacy impact learning?
- How well does it work?
  - What sort of things do learners cope with well?
  - What problems do learners experience/encounter in these tasks?
  - How could information literacy be improved?

Contact was maintained by site visits to each group, with the aim of discussing teachers' observation and reflection and to provide support and encouragement. During these informal meetings the researcher introduced the participants to the definitions, frameworks and models of information literacy which had been developed by the information profession, and recent research implications were discussed (see Appendix D and section 2). The purpose of this brief outline was to give teachers the opportunity to consider whether any of the material currently available struck a chord or had the potential to help teachers develop information literacy in their students by providing tools or ideas which might be incorporated into information-related activities. It was of equal interest to identify any negative reactions and disagreement with the definitions and models as an indication of teachers' own conceptions.

These informal meetings were organised either with the group as a whole or with individual members and were recorded by means of field notes. The logistics of organising meetings within the busy schedules of classroom activities proved problematic and three meetings were conducted immediately prior to the second discussion.

By the end of this reflection phase, the researchers had gained greater depth of understanding of information literacy in classroom practice by examining which aspects of student information handling teachers focused on, as well as teachers'

interpretation of the issues arising and the strategies they employed. Teachers had the chance to engage in focused and supported reflective practice.

During this phase six participants provided written feedback, reflecting on their students' use of information during curriculum tasks undertaken in the classroom and a total of twenty-four participants were available for meetings.

## 3.5 Maintaining Contact

In addition to visits, an online discussion group was set up on the Robert Gordon University Virtual Campus and all current participants were invited to join. Background to the study, guidance on how to start a reflective log and initial feedback on the first Group Discussions were provided on the virtual campus, highlighting a few issues for consideration and a small sample of literature or websites to visit should they be of interest.

Despite reminders and help logging on, only 16 of the 31 participants joined the group and none contributed to discussions or used the resources extensively. Some participants experienced difficulties with using the Virtual Campus. Others indicated their lack of use was due to lack of time to participate in this type of forum or feelings of insecurity in communicating with people they had not met. Direct email contact became the most effective means for the research team to contact teachers. The overall result was that there was less sharing of experiences and ideas *across* the groups than had been intended.

## 3.6 Second Group Discussions

The aim of the second round of group discussions was to establish:

- teachers' conceptions of information literacy after a period of reflection on and/or observation of students working with information;
- which, if any, aspects of the information literacy frameworks, models, research or each others' experiences resonated with teachers and which aspects they disagreed with;
- how and in which contexts information literacy skills, knowledge and understanding might be incorporated into classroom activities and aligned with subject content;
- what participants thought information literacy contributed to learning; and
- how information literacy might be tracked over a period of time.

Prior to the second group discussions, all participants were sent a summary of the early analysis of conceptions of information literacy from the first group discussions, completed activity grids and written reflections of curriculum activities prepared by 6 teachers. Participants were invited to read and reflect on this document in preparation for the second group discussions.

Summary of Protocol for Second Group Discussion:

1. Brief summary of preliminary analysis of data from the first discussion groups, activity grids and teacher logs: early identification of emergent conceptions of information literacy; summary of the range of problems associated with information literacy which had been identified; possible reasons for why these might occur.
2. Initial group discussion to verify and/or add to the above interpretations in

the light of their observations and reading.
3. Main discussion using a further three questions as prompts.
4. Participants were thanked for their contribution to the study and invited to comment on the experience of participation.

Although teachers had been sent summaries of the data analysis from the earlier phases of the research, a brief overview was given as a way of focusing the early discussion and ensuring that all participants had an opportunity to give their views regardless of whether they had read the document.

Following initial discussion of conceptions of information literacy and their views on the relevance and value of models, frameworks and research, the discussion progressed to a further set of issues. Participants were invited to talk quite freely around the following questions:

- How could information literacy skills, knowledge and understanding be aligned more fully with subject-content?
- What would you expect information literacy to contribute to learning in these contexts?
- How might you keep track of information literacy over a period of time?

By the end of the second discussion teachers had provided:

- further depth and detail to their conceptions of information literacy;
- feedback on the value, interest or appropriateness of information literacy frameworks, models, research, and each others comments;
- an understanding of what they expected information literacy to contribute to learning; and
- possible ways in which information literacy development in students might be tracked over a period of time.

Although some of the discussions came to a natural close as topics became exhausted there were others which were constrained by school timetables and more pressing commitments. While overall first and second group discussions varied in length between 40 minutes (or one timetable period) and 1.5 hours, they all contributed the kind of in-depth and rich discussion which lent itself to analysis of the complexities of information literacy and learning.

## 3.7 Data analysis

Group discussions were audio-taped and additional written notes during each session acted as a general aide memoir for the researcher. Verbatim transcripts were prepared with each school, participant and phase coded to ensure anonymity. The transcripts were analysed thematically with the aid of NVivo software.

Transcripts were read, initially to gain a general impression of what was being said and then significant statements were identified. These statements were coded through an iterative process of identification and constant comparison and grouped under the broad themes used to conduct the two discussions and reflection phases:

- conceptions – the relationship between information literacy and learning;
- issues associated with information related tasks;
- type of information related activities and tasks;
- strategies employed during those activities to support students;

- skills, knowledge and understanding involved in finding information;
- how information literacy was perceived to contribute to learning;
- how the development of information literacy might be tracked over time;
- material and comments that attracted attention; and
- teachers' experiences of reflecting on the concept of information literacy.

Data from grids and written reflection logs provided useful additional details which helped in interpreting and contextualising the discussion data.

Conceptions of information literacy were analysed by comparing significant statements for points of variation and agreement around which they could be grouped to form categories of description. The contextual factors associated with each descriptive category were analysed in order to identify the key elements which provide a structural overview of the dimensions of variation of the phenomenon (Marton, 1988). This proved particularly time-consuming given the complexity of the issues which concerned not only teachers' conceptions of the phenomenon as it related to pupil learning, but also their own experiences and roles as teachers. Nevertheless this in-depth analysis proved rewarding and has provided a richer understanding of teachers' conceptions.

All participants were invited to check and comment on a summary of first group discussions, including the initial conceptual categories emerging. This was primarily intended as a way of stimulating further reflection and discussion. However, it also offered an element of member checking to ensure quality and accuracy of data interpretation at that interim stage.

## 3.8 Overview of participants

Table 1 provides a breakdown of the numbers of participants involved in each stage of the data collection phase. As shown the original target of participant teachers was met and as expected there was some fall out of participants towards the end of the study. Participants were self-selecting and represented a range of subject disciplines which are shown in the breakdown in Table 2.

Some teachers had additional roles to their subject discipline, for example one teacher taught English, media studies, drama and thinking skills; another taught history and modern studies; while a history teacher was year group tutor with responsibility for teaching study skills. One participant had a senior management role within his school. These differing interests came up during discussions and illustrated the complexities emerging as teachers described their experiences of information literacy and learning in relation to their particular classroom context. Although there does appear to be some indication that conceptions of information literacy may vary according to the subject discipline, during the reflection period and second group discussion phases this interpretation became less straightforward as a factor of professional interest began to emerge.

Several participating teachers were already involved in other formal CPD activities. Four participants were known to be undertaking modules for Chartered Teachers status, which is a formal, pay-related qualification for those teachers in Scotland who can demonstrate evidence of continued professional development to a recognised standard, and two were involved in the Scottish Executive Assessment is for Learning initiative. The whole group in one school were involved in informal professional development in the form of a research support group and two teachers had links with university education departments. Individual knowledge, understanding and commitment began to emerge as teachers discussed information literacy with reference to their other CPD

interests. Perhaps more important than cultural aspects of different subject disciplines is the way teachers explore unfamiliar concepts, in this case information literacy, in relation to their current priorities in professional learning. As explained in section 2.3, constructivist learning theory and recent information literacy research stress the significant relationship between new and previous knowledge and it may be that this is as important in how teachers conceptualise information literacy as subject discipline. Factors associated with subject discipline and professional learning could not be explored in depth with the sample of participants available. These issues, along with teaching styles and perceived role in supporting students, could be useful areas for further investigation.

**Table 1: Numbers of participants at each phase of the data collection**

| School | Number & Subject Discipline of Participants in 1st Group Discussion | Number & Subject Discipline of Reflection Logs | Number & Subject Discipline of Informal Meeting | Number & Subject Discipline of Participants in 2nd Group Discussion |
|---|---|---|---|---|
| A | 5<br>Computing; 2x English; 2x Science (biology, chemistry) | 1<br>Science (chemistry) | 6<br>Computing; 2x English; 3x Science (biology, chemistry, physics) | 4<br>Computing; 3x Science (biology, chemistry, physics) |
| B | 2<br>English; Science (biology) | 0 | 2<br>English; Science (biology) | 2<br>English; Science (biology) |
| C | 1<br>Geography | 0 | 1<br>Geography | 1<br>Geography |
| D | 3<br>2x Computing; Science (biology) | 1<br>Computing | 2<br>Computing; Science (biology) | 3<br>2x Computing; Science (biology) |
| E | 1<br>Computing | 0 | 1<br>Computing | 0 |
| F | 3<br>English; Geography; Science (physics) | 3<br>English; Geography; Science (physics) | 3<br>English; Geography; Science (physics) | 3<br>English; Geography; Science (physics) |
| G | 6<br>Art; Computing; English; History; 2x Science (biology) | 1<br>History | 6<br>Art; Computing; English; History; 2x Science (biology) | 6<br>Art; Computing; English; History; 2x Science (biology) |
| H | 5<br>Computing; History; Modern Studies; Guidance; Support for Learning | 0 | 4<br>Computing; History; Modern Studies; Guidance; | 4<br>History; Modern Studies; Guidance; Support for Learning |
| I | 5<br>History; Home Economics; Modern Languages; Science (biology); Support for Learning | 0 | 1<br>Science (biology) | 0 |
| **Totals** | **31** | **6** | **26** | **23** |

**Table 2: Breakdown of Teacher Participants by Subject Discipline**

| Main subject discipline of participants | Number of participants |
|---|---|
| Computing | 7 |
| Science - (Biology, Chemistry, Physics) | 7 |
| Social Subjects - (Geography, History, Modern Studies) | 6 |
| English | 5 |
| Support for Learning and Guidance | 3 |
| Art | 1 |
| Home Economics | 1 |
| Modern Languages | 1 |
| **Total** | **31** |

## 3.9 Evaluation of data quality

The discussion groups provided a significant amount of data indicating that these have been successful in giving the depth of feedback sought, and conceptions, issues and strategies began to emerge. At each stage participants were given the opportunity to comment on interpretation of the data. However, as expected, comments were really only forthcoming during the second face-to-face group discussions and even then it was limited to general agreement and a feeling of reassurance from the comments made by others. In addition the Activity Grids completed as part of the focusing exercise provided useful examples of information related activities across the subject disciplines which identified the information literacy skills expected or assumed to be developed in students who undertook these activities.

Six teachers submitted reflection logs or some form of written feedback on their own classroom observations. These reflected on some of the issues relating to information use and learning identified in the group discussions but set in the context of participants' own classroom experiences. This phase did not provide the quantity or depth of data anticipated because participants did not engage in full dialogue with the research team during their observations. It is likely that the ability to engage in purposeful dialogue in relation to a relatively unfamiliar concept or approach requires more time and energy to reflect upon and digest the available material which the timing of this study did not encourage.

As part of the reflection phase all available participants were invited to review the preliminary findings from the first group discussions as well as finding out more about information literacy from the perspective of the information professional (see Appendix D). While the external information about models and frameworks was of some interest, teachers commented more on the value of being able to reflect on the summaries of their own discussions.

The data from the second discussions clarified a number of interpretations made during the course of the study but also revealed shifting and conflicting conceptions and suggested a degree of confusion as participants themselves became more aware of their understanding of the concept and its complexity in the learning environment. All teachers indicated an increased awareness of how their students handle information, their own assumptions of student abilities, and there was broad consensus of the importance of information literacy.

The majority of teachers involved expressed their appreciation of the opportunity to discuss information literacy and related issues with colleagues and some felt the need for more collaboration with colleagues to work through some of these issues and potentially enable a more coherent approach to some of the problems learners encounter. However, it also became apparent that a lack of planning or reflection time and the geography of a school pose significant barriers for some teachers to meet up with those in other departments.

# 4 FINDINGS

## 4.1 Introduction

The following sections explain the major themes emerging from the data: teachers understanding, i.e. their conceptions, of information literacy, and how this relates to student learning, teaching experiences and environment. All individuals approach any learning situation with their own prior experiences, knowledge and understanding; a unique personal background; and differing priorities. These factors in turn are influenced by the external environment and together will influence student and professional behaviour. Thus while teachers described their understanding of students' information literacy, their descriptions were influenced by perceptions of students' individual qualities and background and teachers described how they felt about developing information literacy in relation to their own experiences, knowledge and teaching practice. In addition, participants described the conflicts posed by current educational practice and priorities, including inflexible curricula and cross-curricular initiatives, the way secondary education is organised and standards are assessed. Following a detailed analysis of conceptions and issues, the summary of this section draws the findings together, presenting the dimensions of variation in teachers' understanding of information literacy as an array of six conceptions and four broad structural components of key contextual elements.

## 4.2 Conceptions of information literacy

Table 3 below presents a summary of the different conceptions of student information literacy revealed by teachers. All the conceptions represent differing but inter-related facets of information literacy with little indication by teachers of an obvious hierarchy, although the independent learning conception appeared to reflect their ultimate goal and other categories have an implicit cognitive hierarchy. It is important to remember that aspects of information literacy are flexible and conceptual boundaries themselves are not rigid but have a degree of overlap between them. Although some participants tended to emphasise one particular aspect of information literacy, most individuals presented a number of different conceptions and these conceptions cannot be considered mutually exclusive. More detailed description of the differing conceptions follows in the subsequent sub-sections with quotes from the group discussions. Discussion of the conceptions and their wider implications is considered in Section 5. Each quote is accompanied by a phase identifier referring to group discussion one or two (D1 & D2), followed by a participant identifier (P1, etc.). These quotes often encompass a number of different aspects of information literacy, which in turn may represent differing conceptions and reveal differing contextual elements within the broad framework outlined in the following section. Thus individual quotes are used as illustration and the evidence lies in interpretation of a number of quotes in context.

Teachers from England and Scotland occasionally refer to the curriculum stages, exams, year groups of their students and a comparison of curriculum stages in school education has been set out in Appendix H. The comparison includes UK, Republic of Ireland, USA and Australia as these may have relevance when considering information literacy frameworks worldwide.

**Table 3: Summary of Teachers' Conceptions of Student Information Literacy**

| **Information literacy is conceived and described as:** | |
|---|---|
| Finding information | Emphasis on technology and library, navigation of sources, e.g. Internet and/or books. to find and gather facts |
| Linguistic understanding | Basic listening and reading for comprehension, e.g. understanding instructions and/or task |
| Making meaning | Developing understanding by making sense of new information in a subject context |
| Skills | Focus on using a range of skills, techniques and strategies when handling information |
| Critical awareness | Critical awareness of sources and need for evaluation |
| Independent learning | Working independently with information, e.g. in research projects, less reliant on teacher input. |

This section continues by examining in more depth conceptions of information literacy in relation to student learning and the emphasis teachers placed on differing aspects.

### *4.2.1 Finding information conception*

The emphasis of this conception was on finding information, particularly facts, using technology, the school library and the need for students to be able to navigate sources of information, such as websites, the library, and books. During the majority of the first discussions, participants began describing information literacy as the ability to search the Internet to find information. This remained a significant conception or recurring theme for discussion, in part because of the challenges and issues it poses, for example time taken by learners to find suitable sites and problems of copying and pasting large sections without reading the text. This conception was practical in nature and also included what could be considered traditional library skills, using the catalogue, navigating the shelves, and using contents and index pages to locate specific information from sources.

D1.P4 *"[what] we're finding is a great inability to use search engines, etc. and filter out from all the amazing stuff you can get on the Internet"*
D1.P6 *"what it means to me is the ability for a pupil to access the web...because they have to keep up to date with...scientific work that's going on just now"*
D1.P11 *"I think my understanding is sort of how people get and use information, where they find it, how, the process they go through to find it, how easily. Somebody who is information literate is going to be very adept at locating relevant information successfully."*
D1.P13 *"You have got the first practical issues of can you use the index, can you use the Internet, can you find the information?"*
D1.P13 *"Some of it must be information literacy, knowing where to find out, the basic things about knowing how to use a library, how to do a search on the engines..."*
D1.P19 *"I was thinking about the lessons we did in the library, research lessons, where instead of me just giving out the information I ask them to go the try and find it, to make it a bit more active."*
D1.P23 *"how to search appropriately"*
D1.P17 *"they don't know how to use different types of resources"*

When discussing this conception teachers were often referring to research project work, which focused on finding information from the Internet, books or resources from the library. However, a wide range of other activities were mentioned during the course of discussion and described on the completed Activity Grids (see Appendix G for examples) and in some of these examples students were described as having difficulties when finding answers within a page of text or when seeking information from worksheets or in exams.

### *4.2.2 Linguistic understanding conception*

A second way of conceptualising information literacy is the idea of basic comprehension of textual or verbal information, including instructions for a particular activity. This conception was interpreted as one of reading literacy, listening skills and basic understanding which relies to an extent on general knowledge and prior experiences in similar activities. The conception does not include interpretation of information within the subject context which is seen as the more sophisticated cognitive process of 'making meaning' but may require some basic knowledge of subject specific terminology.

D1.P22 *"I suppose my first [thought] would be that [information literacy] would be more the kind of technical end, new ways of accessing information but it's actually much, much more basic than that, it's to what extent can students listen to an instruction then carry out the task that has been described or alternatively read an instruction and carry out that task. So it's actually as fundamental as that and then you can indeed presumably go right up to much more sophisticated skills"*
D2.P16 *"But it is about reading isn't it, because obviously I teach IT so I get the kids, certainly in 6th Form, who are the best at technically using computers ...they understand how the Internet works and you know they are right up to date on the software...if you set them an essay or something like that they cannot do it. It suggests that it is more, even though most of them use the Internet as a source it's more about how good they are at reading, isn't it?"*
D2.P7 *"I don't know if this is really part of what your research involves or not because it's not actually gaining particular pieces of information, but in terms of understanding instructions and being informed about what they are supposed to be doing"*
D1.P27 *"some of them are so familiar with using computers now they click, click, click on things and they don't really read the information that is on the screen."*
D1.P1 *"also deciding if the information is understandable or not"*
D1.13 *"can you understand what you are reading?"*
*D1.P2 "even simple vocabulary we take for granted, they don't understand, words like 'anxiety'*
D2.P16 *"strongly linked to being effective in information literacy, is having a good vocabulary because one of the things I have found...was their inability to use synonyms...so where a question is phrased [using] a very similar word they don't identify where there's a reference to it in a text"*
D1.P2 *"Trying to get them to look up a dictionary is so difficult"*

### *4.2.3 Making meaning conception*

Another conception encompassed the cognitive processes which help students make sense of information from different sources and formats and make connections between new information and the specific subject under consideration. These were viewed as advanced cognitive skills which some teachers saw as dependent upon age and maturity, with one participant mentioning Piaget's stages of development (P3). Teachers also mentioned a number of specific resources used for information-related activities within different subject disciplines, for example fictional writing, marketing material, works of art, videos, photographs and scientific journals. Implicit in the discussions was recognition that understanding and making sense of information in subject context required the use of a number of different skills and processes, for example summarising, synthesising, interpreting, decision-making. It was considered important for students, indeed essential for senior students, to be able to develop their own understanding of new information in relation to previous knowledge.

D1.P22 *"he's able to read what it is but he's not making the link [between] the given task and where the answer is"*
D1.P23 *"I'd say that information literacy is being able to select the correct information that you need for whatever purpose you need it for"*
D1.P25 *"reading for understanding, selection of relevant information, ability to write coherent answers"*
D1.P15 *"The ability of pupils to select information, to process it and to use it for whatever the end product was...being able to summarise huge amounts of information and pick out what is actually relevant for what they are trying to achieve."*
D2.P18 *"idea of processing information, turning it into something else, taking a source and using it and processing it and changing it"*
D1.P12 *"I would interpret information literacy to do with the ability to handle it ....there is a content element as well as the issue of processing...the ability of people to use concepts of various kinds in order then to manipulate information"*
D1.P13 *"being able to actually take in what the main ideas are from something that they are reading and therefore be able to pick out the key ideas and put that into words and summarise"*
D1.P8 *"They are good at picking up one or two textbooks and taking the first bit of information they find. What they're not very good at is looking at a whole range of sources and saying that's good and that's bad, I'll take this bit from here, I'll take that bit there"*
D2.P6 *"I think it's quite important that they understand what they're reading in the [news]paper*

While the initial discussions tended to relate to specific research project activities, there was a shift in discussion to include cognitive processes incorporating a wider range of information-related tasks. This discussion was often dominated by a notion of student *'illiteracy'* (P16) in this respect. Participants generally accepted that students' ICT skills are developing, that they are becoming more technically accomplished, but students often lack the skills required to intellectually process information in the context of specific curricular tasks. As a few of the quotes suggest, the notion of purpose was mentioned but not explored.

### *4.2.4 Skills conception*

Right from the start teachers mentioned, explicitly and implicitly, a wide variety of practical and cognitive skills they associated with information handling. These skills ranged from what might be described as traditional library and information skills, encompassing practical finding skills, through to more cognitive skills required for making meaning and the need for evaluation and reflection which characterise more recent information literacy frameworks. As discussions progressed, teachers themselves became increasingly aware of the wide range of skills involved when using information, many of which they had previously taken for granted. Thus the emphasis of this conception is the range of skills required to handle information effectively. Analysis of the first group discussions, the completed Activity Grids and reflection logs revealed this range, some of which are set out in Appendix E, for example: locating relevant information, knowing how to use a library, how to do a search on the [search] engines, listen to an instruction, read an instruction, paraphrasing, integrating, reorganising, pick out key ideas, summarise, synthesising, write coherent answers, appreciation of bias, skim read.

When teachers were thinking about research projects skills were described in terms of a series of linked and inter-related skills.

> D1.P8 *"it's being able to handle a range of information sources, and process the information, manipulate information, and, as far as my subject is concerned [geography], deal with a range of information sources at the same time and then be able to present those in a meaningful way"*
> D1.P14 *"I think it goes a lot wider the more you think about it, there's a lot of skills which we don't really notice being there...I think it requires an intellectual confidence"*
> D2.P1 *"I think we might have focused too much on reading the information... there's diagrams, graphs...being information literate means balancing all those different things"*
> D1.P12 *"I would interpret information literacy to do with the ability to handle [information] rather than the actual content...the notion of manipulation in the sense that you can bring things together and then present them"*

On other occasions skills were identified as cognitive skills students found problematic but encountered in a variety of different curriculum tasks. These skills, although also implying the need for understanding and linking with other aspects of the task, i.e. making connections, were given as examples of individual skills that curriculum activities required students to be competent at tackling if they are to achieve quality learning outcomes.

> D1.P2 *"reorganising it...into levels of importance, they find very difficult"*
> D1.P1 *"I suppose that comes down to kind of monitoring their understanding as they go along, it's a skill that they seem to be lacking"*
> D2.P13 *"...if you are looking in a text book and getting them to skim read a passage and pick points out, then that's information literacy"*
> D1.P3 *"paraphrasing it or integrating it into what they are going to do instead of just copying it all out"*

Participants were aware that some skills, particularly the finding skills, can both be taught or picked up quite quickly given practice and that students can and do

transfer these across subject disciplines. Teachers acknowledged that students' ICT skills have developed over the past few years; that students are more technically accomplished; but recognised that cognitive aspects of the process, for example synthesising and paraphrasing, are more difficult for students to master. On occasions teachers mentioned the need to provide opportunities to practice or develop these skills, but the majority did not see information literacy skills development as a priority within their subject teaching.

### *4.2.5 Critical awareness of sources conception*

The conception of 'critical awareness' identified by teachers focused on the need to evaluate sources, recognise bias, determine the quality of the information and check the authority of a website. The history and English teachers in the study were particularly aware of the need for critical examination of source documents because they considered this to be fundamental to the subject discipline. For other teachers an awareness of unreliable information on the Internet prompted their discussion of this conception.

> D1.P13 *"we come back to that idea of selecting information from the Internet, an appreciation of the bias that you can get out there and newspapers, the emotive language, the bias and the stance of some newspapers...are they aware of that in their processing of that information?"*
> D1.P10 *"and saying what the biases are likely to be and how reliable the information's likely to be, where the source is coming from, what the motivation of the person who wrote it was"*
> D1.P11 *"Now they use a search engine which will mostly be Google...they'll go for the first hit that comes up...the biggest difficulty I feel is persuading pupils to look beyond even that first page of hits and trying to assess how good the information is..."*
> D1.P11 *"The point is going to come when you are going to have to look at the content and how you decide what is good content and what is not"*
> D1.P23 *"...and understand the pitfalls of the Internet"*

### *4.2.6 Independent learning conception*

One of the recurring themes during the discussions was that being information literate would result in independent learning. Although not fully explained by teachers, the conception implied the ability to confidently and independently select and apply relevant skills when working with information and be less reliant on teacher input. This implies a mastery of the skills discussed above and itemised in Appendix E in order to develop appropriate strategies to handle information in relation to purpose and in a variety of situations, including the various research projects set during the course of the secondary school years.

> D2.P17 *"when we were working on the schemes for history one of our aims we said was to create independent learners and you can't have an independent learner that doesn't have these information literacy skills"*
> D1.P21 *"it may be something that's developed over many, many years that those that are good researchers can get on with things very independently"*
> D2.P10 *"I think we probably all agree, that if we were teaching people these skills...it would produce people that were much more independent learners"*

D2.P8 *"I think they would be better at handling information, they would also be more critical of sources and I think that's really important. They would be more independent because they wouldn't need to be spoon-fed as much in terms of how to get information and how to get good information I think that would be great"*
D1.P8 *"...to be able to go out into the wider world and select information and evaluate it, whether they think it's worthwhile or not worthwhile and then process and handle it as well"*

## 4.3 Contribution to learning

Participants were invited to reflect on what information literacy contributes to learning. Teachers expressed the opinion that information literacy could enable students to become more efficient and effective learners and the way they described the impact on learning tended to fall into four distinct facets of learning:

- affective elements,
- efficiency in the way information was handled,
- achievements in terms of results, and
- new or greater knowledge.

In addition to the general discussion, several teachers were able to give specific examples from their own experiences of the way aspects of information literacy had contributed to learning. Two teachers introduced changes in their approach to teaching as a result of observation and reflection on students' information handling. One teacher concentrated on helping students recognise and develop the strategies they use to select relevant information from a page of text. The other asked students to read relevant texts in class and then provided the opportunity for discussion about what they had learned, encouraging them to consider the difference in their learning between being told the facts and reading about the subject. Both of these teachers saw short term contributions to student information handling (P14 & 17). Another teacher (P13) referred to a time at her school when an information skills course was in place and she felt students were better prepared for locating information after such a course. Participant 19 felt over the past year she had trained her students to fact-find efficiently. However, the majority of discussion about contributions to learning was speculative rather than actual and this is due in part to teachers not necessarily looking closely at students' use of information or knowing how to encourage more effective or efficient strategies.

### *4.3.1 Contributions to affective elements*

Information literacy was thought to promote confidence, ownership and more positive attitude to learning and ultimately independence. This was noticed by P17 during his reflective practice: *"...they are becoming independent learners, I think they are going down the right route, I enjoy teaching my Year 7s now, I don't have the same struggles of, we can't, we are not going to read it"* (D2.P17).

Confidence was thought to enable more independent learning which was seen as key to lifelong learning. Lower ability students (implicitly recognised as those with reading difficulties) were thought to be particularly in need of this form of confidence-building while more able students were thought to naturally develop strategies that give them the confidence to handle information. What became apparent is that these affective elements and their relationship with information literacy are difficult to isolate from the general learning and teaching environment.

Providing an atmosphere where students' opinions are valued, where discussion and reflection is encouraged is fundamental not only for affective elements of learning but also for skills training and developing information literacy, yet teachers acknowledged that this is difficult to achieve with tight curriculum schedules.

> D2.P6 *"you know it might bring on the poorer kids into being more confident on how to set things out and present things and look for things and find information out and use what's there"*
> D2.P10 *"...probably their attention is going to be improved...it's going to help them to take responsibility for their own learning and also to be more confident in that sort of environment"*
> D2.P17 *"we have actually cut down the content of the course...because we want time for the students to be reflective, we want to say: 'What did you do well? What went wrong?'"*

### *4.3.2 Contribution to efficient information handling*

Teachers described efficiency in the way information is handled as being one contribution that information literacy could make to student learning. Although these contributions to learning tended to be rather general in nature, when analysed, teachers appeared to be referring to students' ability to apply strategies to find and extract information from resources with the minimum of support or wasted time and effort, thus allowing more scope for further development of activities in relation to subject outcomes.

> D2.P10 *"Well if they can extract information more easily then that makes learning much easier and they would be less frustrated because they have got it quicker"*
> D2.P15 *"I'm sure lots of the skills that they learned could be applied through all of their different subjects."*
> D2.P8 *"they would be better at handling information, they would also be more critical of sources"*
> D2.P16 *"it would improve the quality of learning without any doubt, it would make a lot of activities more efficient and it would give teachers more freedom to give the kind of open-ended activities that develop skills more and get a kind of knock on effect"*

As illustrated in the first quote above, affective elements of learning and efficient information handling are inter-related, an increased ability to apply skills could lead to less frustration, and is likely to increase confidence. Two teachers (P14 & 17) found ways of incorporating aspects of information literacy skills development into their teaching, one concentrating on extracting relevant information from a passage of text and the other one reading for information and reflecting on how that helped their understanding of the subject. Both indicated that their trial had been successful in developing greater awareness and efficiency of information skills within their subject although evidence of longer term skills development was not available. Participant 19 reflected on how practising fact finding had made one class more efficient at extracting relevant factual information from resources.

### *4.3.3 Contribution to achievement*

Although participants seemed confident that information literacy could contribute to

lifelong learning and more general aspects of learning, there was less consensus about the extent to which information literacy might contribute to achievement in terms of exam results and coursework. One of the problems appears to lie in the prescriptive nature of curricula and assessment criteria which give little reward for additional information and extended knowledge. Participant 8 suggested that aspects of information literacy are in the curriculum but are not obvious and outcomes tend to be subject not process orientated. The majority of teachers did identify ways in which information literacy skills and techniques might apply in coursework and exams, while a few found it difficult to relate information literacy to what they saw as the formulaic training students receive for exams.

> D1.P21 *"All the way through the marks could go up for everything if you understood and were confident enough to read chunks of information and know you were going to be able to extract the information"*
> D2.P18 *"if they've had the process of researching and extracting relevant information from the given texts and techniques that they might have used on the given texts and understood them...when it comes to the unseen paper in the exam they can apply the same research skills"*
> D2.P10 *"ironically the way I think most schools are set up there is very little motivation for us to teach these things, in fact there is almost a negative sort of inducement to do it because it is going to affect, maybe, the grades of pupils because if you spend lots of time doing this you're not going to spend as much time teaching them the course."*
> D2.P20 *"I think it would show more than in the exam, you know, just copying it out, if they are better in their own words and extracting the information better, I think it will improve definitely their coursework"*

There was a general feeling that teachers could get the results in exams without their students necessarily being information literate, that exams are not a true test of subject knowledge or skills needed to gain that knowledge. However, P6 did think senior Advanced Higher students would have to be information literate to succeed in the course, in particular their independent biology investigation. Participants 11 and 3 also saw some skills development as being implicit at certain levels of achievement although skills development is not formally monitored.

Some teachers were hesitant about what information literacy would contribute to achievement and results because they felt it depends on what is being assessed, which learning objectives are being targeted, and how they are measured.

> D2.P1 *"It probably does [contribute to results] but you've got to have different measures to prove it, otherwise you can prove that you've battered stuff into them...all [they've] got to do is regurgitate the ten facts"*

### *4.3.4 Contribution to new or greater knowledge*

Although this did not come out as an obvious conception or an immediate outcome of information literacy, greater knowledge or new knowledge was mentioned as a possible way in which information literacy might contribute to learning.

> D2.P11 *"if that's what the outcome is then...if it's a sort of research focus activity where you are wanting to find out or expand their knowledge of a particular area"*
> D2.P10 *"if people are able to do these things then I think they are going*

*to, their understanding is going to be deeper than if they had just been given it"*
D2.P15 *"I think if someone is good at information literacy, that you would expect them to have a far wider knowledge, and have an ability to sort of read around their subject, you know not just the bare minimum"*

One teacher (P11) considered expansion of knowledge as a possible contribution to achievement but that a lack of knowledge was not necessarily due to poor information literacy. One of the possible tensions here is the contradictory messages teachers revealed about where information literacy stands in relation to teaching, learning and subject discipline, which will be explored in more detail in sections 4.5 and 4.6.

## 4.4 Information literacy and student context

All individuals approach any situation with their own unique knowledge and experience, with differing personal attributes and family backgrounds, which in turn influence motivation and attitude to learning, as well as competencies and abilities and thus differing challenges encountered.

A major part of the group discussions focused on problems that students encounter when handling information and these remained consistent across all the groups; focusing upon challenges associated with reading, selecting and interpreting information. Teachers described students' ability to use these skills as very mixed and explained differences in terms of family background, attitude to learning and personal attributes.

Some skills appear to be relatively straightforward for students to develop, such as using the index and contents pages to find information required. However, even relatively simple skills are not always employed by students which teachers related to an inability in some students to transfer skills across the curriculum. Other skills, for example, analysing and synthesising information from several sources, teachers acknowledged as difficult to master and they appeared to be less confident supporting the development of these complex cognitive skills.

*D1.P7 "Once they've accessed the information there's problems with organising it I find, even with seniors. They find it difficult to sift through...problems with putting ideas into their own words..."*
*D1.P13 "They might be good with the mechanics of it but they are not necessarily then good at processing or selecting"*
*D1.P28 "youngsters are very good at gathering the information, they are pretty good at presenting the information but they are not really good at the bit in between which is the selecting the appropriate stuff out of the wealth of information they gather."*

Indeed there was a general feeling that some students have the ability to see connections and develop the skills required to be information literate quite naturally while others do not. Participant 6 appears to link this to general knowledge, while others related it to reading ability. Teachers viewed some students as capable but unwilling to commit themselves to particular activities. Students' negative attitudes to learning may reflect a lack of skills and understanding that needs to be addressed before they gain confidence to attempt information-related tasks and teachers admitted making assumptions about students' abilities to work with information. Participant 21 voiced the opinion that conscientious females tended to get on in the

library, whereas participants in School A observed that sometimes more able students wait for answers to be given to them while less able students like the experience of finding out and the freedom that this type of lesson provides for interaction. The reasons for these differences were not discussed in any depth but were implied to indicate differing styles of learning.

> D1.P6 *"I feel there's a lack of using books, you know research information from books and even general knowledge about the world and countries in the world and capitals, I find that kids lack that knowledge"*
> D1.P19 *"I think it feels a bit like laziness... can't be bothered to read the information to scan it, they just want the answer on the page."*
> D1.P14 *"...also there's not always a willingness to try and understand and I think that part of it is that children will always be seen to be doing things, they want knowledge, they want content and what they are very unwilling to do is think..."*
> D1.P4 *"Now kids just want you to ask them questions from the actual coursework so all they need is their jotter...Those kids are switched off by having to go and find out information for themselves."*

Those students whom teachers appeared to consider, at least in part, information literate were also thought to be motivated to learn, to have an enquiring mind, to be competent readers, have support from home and have achieved the appropriate developmental stage earlier. Home environment and experiences at primary school were seen as more significant than participants' own input in helping to develop information literacy competency at the more complex cognitive levels.

> D1.P21 *"I feel like those skills they've probably learnt at home...when you find something interesting you go and find out about it... and I don't feel that's something that they've learnt here, I do think it's something they've got from doing it in their own time."*
> D2.P1 *"...some of them have been given better clues from their background as to how to handle information than others..."*
> D2.P19 *"I just think it's a skill that some of the brighter kids have and I don't know, I don't know how much it is to do with school life"*
> D1.P3 *"they don't expect to be able to read it...they take it for granted that this is all far too difficult"*

Another attitude to learning that was touched upon by teachers was students' perception of whether aspects of what they were taught, including skills, are directly relevant to the curriculum or passing exams. Participant 1 suggested that some expect to *"regurgitate the ten facts"* (D2.P1) that they've been given. The curriculum structure appears to encourage a narrow approach to learning and discourage risk-taking in students or, as P8 suggests, thinking outside the box: *"It's a real struggle by then [Highers] because pupils start to get ingrained attitudes…getting them to think outwith the box...can be a real struggle"* (D1.P8)

## 4.5 Information literacy and teacher context

As already outlined in section 4.4, students bring their own individual mix of experience, competency and attitudes to any learning situation. In a similar way, teachers have a personal context which influences their professional teaching and learning and they also have to accommodate external pressures imposed by colleagues, school, parents and government, which will be described in section 4.6.

This section considers how teachers viewed the development of information literacy in relation to their personal context: what they were expecting of students, their own knowledge of information literacy and their own particular teaching and learning priorities. Teachers considered information literacy to be important but not necessarily something they could easily support.

Teachers acknowledged that information-related tasks, such as research projects, were often used as a means of providing variety in class activities intended to motivate students. However, there was recognition that those students who struggle with information skills might in practice find these activities to be de-motivating, especially as teachers admitted to making assumptions about students' abilities to work with information. Again, teachers were acknowledging a link between the ability to apply skills and affective elements of learning (see 4.3.2).

> D1.P14 *"Giving them a task that requires thinking...you ask them to do something which isn't straightforward, they don't see it as a challenge they see it as a threat I think, low motivation and low self-esteem children"*
> D1.P22 *"I think a lot of the time [we are] making unwarranted assumptions about the abilities of more able kids, that they somehow can simply do all this for themselves..."*
> D1.P8 *"I suppose we do talk about it less in Higher because we always assume that they've somehow got there by then..."*
> D1.P4 *"I just assumed that all S1 pupils could actually do that [use search engines to find relevant information] and I was sad to find out that a whole lot of them can't do it and don't know where to start, and are put off by this large amount of information in front of them."*

Some participants began to question the tasks set from the point of view of the students and their assumptions of competencies of even the more able students.

> D2.P13 *"we are not really thinking about what we are wanting the children to learn and understand through the activity, so that's an important aspect"*
> D1.P14 *"I suppose when we're doing projects in science, probably the motivation is most people's heads or why we're doing the project well you kind of know it's a good thing to do project work now and then, it varies the curriculum a bit and it's another way of teaching them the material but I don't think that in most people's heads there's an active decision to help them develop their information skills, I think it's more about teaching them the science in a slightly different way which might be quite fun."*
> D1.P16 *"We're not talking about them being information literate even though you might expect that they would be really but we're actually describing all the things they can't do, like pick keywords out and autonomously go to a library to look for something and that kind of thing and to judge the relevance of a web page"*

In fact even the apparently simple practical tasks of using contents and index pages require quite sophisticated cognitive process to interpret what the task is demanding and the information needed, and decisions to be made that require further information and understanding. Towards the end of the study, discussions suggested teachers were beginning to appreciate the complexity of cognitive processes behind information literacy. Participants began to reflect how they

themselves learned the analytical skills to become information literate. They suggested that the type of tasks they had been set at school might have contributed, such as project work at primary, doing summaries and précis and learning by rote. Others indicated that they had learned some of these competencies at university (P10, 31) and not at school. However, it was common for participants to feel unsure what their role was in the development of effective information literacy competencies or that their efforts had long-term impact, despite the number of supporting strategies that were described.

> D2.P1 *"I don't know how well you can get to the actual process...the problem is getting to the thought processes, I can't understand why they can't do it"*
> D1.P18 *"We do all different kinds of reading strategies but they aren't able to put them into practice in other areas...they just can't see the connection"*
> D2.P5 *"I'm not perfect but I would like to think that I tried my best to get information over to the kids...but they don't start..."*
> D1.P14 *"I think generally understanding what you're doing and why you're doing it and what skills you're learning – that seems to be what all the current research is saying and so I would say it does help but I think sometimes it's hard to, I mean how do you explain, certainly the summarising thing, how on earth do you convince people that it's worth learning how to put a passage into your own words?"*

The illusive nature of information literacy was also reflected in the way teachers described monitoring student development of information literacy skills. They described monitoring skills as difficult, noting that much of the thinking that lies behind skills development is intangible and inaccessible, especially to an outsider but also to the learner. However, P17 suggested encouraging students to think about which subjects they had used particular information literacy skills in, in an attempt to get them reflecting not only on the skills themselves but also on their applicability across the curriculum. Although teachers reported that they informally monitor skills development, the way they discussed their students use of information suggested that this is done in a very superficial and ad-hoc basis. Most teachers suggested that any formal monitoring, including close observation and discussion, would be very time-consuming and impractical. However, P14 did suggest that perhaps as teachers they were not always looking at the most appropriate outcomes.

> D2.P7 *"I think you have to certainly evaluate it in some way or another, otherwise you're kind of doing and just hoping that it's making a difference, assessment is quite a formal word, I don't know if I would really want to use that word"*
> D2.P10 *"I think it would be a very difficult thing to assess and it would be a very time-consuming thing to assess"*
> D2.P14 *"I think we have been a bit complicit in some ways in meeting activity objectives rather than looking at our learning objectives."*
> D2.P14 *"you know there are assessed elements in all of our subjects which involve information literacy more directly...they have exam questions which simply ask them to get information from a piece of text"*
> D2.P25 *"presumably you could keep track of information literacy over a period of time by seeing how effective, seeing how much more they can find out for themselves."*

The early stages of any new understanding is characterised by a lack of clarity and illusiveness of the main ideas and it is likely that it is still too early in these teachers' understanding of information literacy for them to find efficient and effective means of monitoring progress.

The more participants discussed information literacy and began to recognise the variety and complexity of skills that information literate individuals need to develop and apply, the more these teachers considered information literacy to be important not only for lifelong learning but also fundamental for their own subject disciplines.

> D1.P8 *"...they have to develop skills in information literacy to be able to...go out into the wider world and select information and evaluate it, whether they think it is worthwhile or not worthwhile"*
> D2.P16 *"...we're in the business of producing lifelong learners now...and clearly information literacy is going to be a skill we're going to need to do that..."*
> D2.P14 *"...if people actually sat and thought about it, I think we all need the kids to have these skills...it's directly useful in our subject"*
> D2.P14 *"If they are not able to cope with the information literacy side of it [project work] then that other subject function isn't going to happen anyway, it becomes meaningless, if all they are doing is copying and posting chunks of work then they aren't getting the benefit of it at any level"*
> D2.P11 *"Nobody would dispute the fact that information literacy is a desirable aim and it's just a question of priority"*

Despite the small numbers of participants involved in the study, there do appear to be indications that the cultural differences of subject disciplines may influence the emphasis placed on particular information literacy skills. English teachers viewed the use of information as fully incorporated into the curriculum; they acknowledged that developing arguments and recognising writer's bias are important skills for English as a discipline: *"it's not just the information, it's the connection of ideas and how arguments are put forward"* (D1.P13). Participant 13 also valued library sessions for understanding the organisation of information as well as fact-finding to present to a specified audience. Participant 3 emphasised evaluating sources for opinion and bias and pointed out the value of fiction for general knowledge and bringing other subjects to life, and P18 concentrated on interpretation of text and selection of passages as supporting evidence. They all stated that the majority of students struggle with interpretative skills.

Science teachers were not always sure where the boundaries lie between information literacy and science. They took differing stances on how important opinions, as opposed to facts, are in science education and also whether interpretation of data was part of information literacy or subject discipline. While some emphasised their requirement for factual information, they were also aware that many students had difficulties understanding what they are reading in a scientific context, i.e. making connections with subject matter. Participant 14 took this as her focus for reflective practice, using her own experiences of extracting information from text to guide her students.

> D1.P1 *"One of the difficulties might be though, that in science we tend to use information as information, which we're taking, at least at the moment, to be fact. Whereas in history some of the text will be evidence, open to interpretation."*
> D1.P6 *"I'm using the internet in a different way. We're looking for fact."*

D2.P14 *"that [getting facts] probably is what we ask them to get....Are we only asking them to investigate things which require facts when we should be getting them to be investigating opinions?"*
D1.P16 *"I've only ever studied sciences since I was 16 so there are always right answers whereas if I'd done English, History, Social Science, Art or whatever...people who do those subjects think in a different way, don't they?"*
D2.P21 *"I think, I suppose they do, we do analyse data they have got from experiments but I mean, it is, we do do that, in the investigation skills that we have, but it's information, I don't know if this would come into information literacy or not, it's information that they have gained from doing a practical experiment, is that information literacy? It's information problem solving so it would fit that heading I suppose, but they use their information, they analyse it, they draw a graph and they explain what they show..."*

Social subjects and ICT have specific information techniques and terminology, which influences the way they interpret information literacy. In some cases the structure of the curriculum and the formulaic method of teaching for exams were thought to be a hindrance to developing information literacy. One history teacher (P17) saw the value of making some skills more explicit and of taking content out of the curriculum to allow students to reflect on the value of different information and sources. Participants 17 and 25 saw some aspects of information literacy as similar to aspects of historical document analysis, both mentioning visual as well as textual sources of historical evidence.

D1.P23 *"I'm different because I teach Information Systems so I teach the students what makes good information ....there's eleven characteristics in Information Systems and eight in Business Management and the terminology is different..."* [ICT]
D1.P25 *"There's two different sets of enquiry skills because I teach Modern Studies enquiry skills one way and you have to teach History enquiry skills another way and quite often I am teaching the same students"* [History, Modern Studies]
D1.P7 *"There's not so much involvement in the drama teaching really at all, or PSE or in thinking skills particularly but mostly for English and for media studies information is important."* [English, Drama, Personal & Social Education]

Different subject teachers identified specific sources of information and techniques used to interpret information within those sources that were of particular importance to their discipline and the distinction between information literacy and subject was not always clear. Thus, fictional writing, works of art, photographs and scientific journals were examples of specific sources used for analysis given by English, art, history and science teachers respectively. Although recognised as valuable, teachers were not always in a position to look beyond their own subject to make connections between subjects which could form the basis of shared understanding to develop foundations laid in other disciplines. Despite this, these teachers were wary of information literacy models and were unsure how to develop students' information literacy or even whether information literacy skills as such needed to be taught or monitored.

Teachers acknowledged that information literacy is embedded in curriculum documentation and the completed Activity Grids and discussions provided numerous

examples of information-related curriculum activities (see Appendix G). Participant 6 commented that teachers are already involved in information literacy activities but *"we haven't been focusing on it, so it's been there but we just haven't really dwelt on it"* (D2.P6). The subject focus meant teachers were not closely observing how students handle information and were not ready to monitor progress or mediate in the most appropriate manner. Despite the variety of contexts and cultural differences in disciplines, teachers' views on facets that contribute to the information process remained comparable and these are represented in the conceptions of information literacy described in section 4.2.

Teachers also described a number of teaching strategies they use to support information-related activities and minimise some of the problems encountered by students or issues teachers feel detract from the intended learning outcomes.

One widely used strategy is for teachers to direct learners to specific sources of information. For example, several teachers pre-select websites to avoid the problems of wasted time and students using inappropriate sites while still providing the motivating experience of using the Internet.

> D1.P7 *"...I find that if I give them the website address they'll have no problem at all"*
> D1.P31 *"I got round it by selecting websites in advance ...because in History you'll find people can set up a website and put any kind of drivel...so it was to show them what a good site was and where good information could be found but then I also didn't show them the bad sites because they would be very drawn to them, they would have spent more time on that..."*

As the last quote suggests, there was little evidence that teachers used mistakes made by students, such as poor choice of websites, as an opportunity to highlight the need to evaluate resources and information from sources and how their choice of resources and selection of information influences the quality of work and learning. Encouraging students to reflect and discuss how tasks are tackled was discussed but did not appear to be a natural part of the learning and teaching approaches used by the majority of teachers.

A few teachers used the library to evaluate the benefits of particular sources, books versus the Internet for example, in different situations. There was also evidence that some teachers find the freedom students experience in the library situation difficult to control and even organising activities around information resources unfamiliar. Two teachers in one school (F) both had their classrooms a short walk from the school library. One of these teachers (P13) was used to using the library and librarian's knowledge of resources for class activities. The other teacher (P15) felt students were too unfocused while in the library but was pleasantly surprised to realise she could ask for resources for the classroom and continued her dialogue with the librarian after the reflection period of the study. These teachers also illustrate differing experiences of libraries and differing understanding of what a librarian's role might be and the support they could call upon either for professional or student learning. Again this reflects the way individual prior knowledge, understanding and experience are so influential in all decision-making, in this case teachers deciding about whether or how they should integrate information activities with the curriculum.

When setting project work, participants 13 and 15 encouraged students to think of younger children as the target audience for their finished work. This appears to be

a common strategy thought to help students select and present information. Teachers did not express any questioning of whether choice of audience might influence the choice of information strategies or result in different knowledge gain.

Another common strategy was the provision of frameworks or strategies for students to use when selecting information. Some teachers set questions that target very specific answers in order to give students clear direction to find information rather than get bogged down with thinking about writing structure.

> D1.P19 *"I find now that my questions have got more and more matched to exactly the answer that I want so the answer is fairly close to the question only a couple of words missing."*
> D1.P14 *"a bit like a writing frame, it had all the sections done so they were not developing the skill of remembering to do their introduction, etc., the higher ability pupils had that challenge as well, so really it was more about getting the information and then in some places putting it into your own words..."*
> D1.P31 *"It's really like a writing frame, it's just a step by step account of this is what to do next. There's also a supportive one which will give a trigger sentence to start off the particular paragraph..."*
> D1.P15 *"while they are watching the video they are supposed to be taking notes trying to pick out the key things ... they find that quite difficult but I often get mine to take notes while watching a video, not huge notes but ...like a simple spider diagram and that really keeps them focused on what is going on"*
> D1.P3 *"They need templates, they need mind maps, the whole business, they need all of that in order to use that information"*

However, participant 14 recognised that this did not provide enough or the right kind of support for some students. During the reflection period she began to explore with students how they could develop different strategies to find information from within a given text, by providing class reflection on the use of headings, bold print, pictures and captions and linking their information selection to the specific task under consideration. Others began to question whether too much help was hindering students' development of information literacy and appeared to agree with P14 who suggested that they were in fact "*implicitly collaborating with them in producing these copied and pasted projects*" (D2.P14) by the way in which tasks were set and supported.

The majority of teachers began to question their interpretation of information literacy or reflect on what they were doing with their students as a result of the discussions. This type of questioning and reflection are part of the process of learning and understanding that the teachers themselves were going through, although some of the reflection was quite individual and isolated in nature.

> D1.P16 *"interesting type of differentiation [how the information is organised and presented], it's not science differentiation... the science is no harder...It's differentiation [for] those that have got better information skills and I would never have thought about that before."*
> D1.P11 *"... that comes back to the original question in a way which is do we need to teach that [Boolean search strategies] or is it good enough for users as long as they have the concept of significant keywords to punch those in and get what they want because our experience is that most of the time that does."*
> D1.P11 *"But I think the whole summarising skill is one that is difficult for*

*skilled adults to do... assimilate the information and understand it before you can distil it and reproduce it in a different form that takes an awful lot of time ... sometimes the tasks that we use the Internet for are often seen as an opportunity to give something a practical focus to perhaps what is otherwise a theoretical topic or a fairly dry topic. It gives pupils a chance to do something or it gives them the chance to produce an end product which is quite nice...And as a result we probably don't give them enough time and space to say okay once you have found a good source this is what we want to do with the information we're just saying find the source and produce the presentation or produce the poster or something like that. And sometimes we probably don't place too much store by the quality of the end product."*
D2.P14 *"I think before it was a frustration with the pupils for being hopeless at it [selecting information], now it's more of a recognition that it's not the pupils' fault...the system isn't giving them the chance to develop the skills"*
D1.P14 *"I was just thinking why would they want to put it into their own words when somebody's put it much better than they could do"*
D1.P2 & 3 *"Would interpretation count? I don't think so. Because I've given them information in a passage and then the questions are to try to elicit what they've understood from what they've read" P3 "Mm, they're looking for more in literature, it's not really the same, it's not really research as such"*

Teachers found different ways of relating information literacy to their professional practice. Some teachers related it other professional development activities they were involved with, including collaborative learning (P5), and formative assessment (P7 & P14) and tried to see ways of encouraging strategies through peer support or stating lesson objectives and giving feedback within class time. As already described in section 4.3, participants 14 and 17 used their own experiences and knowledge of learning theory, constructivism and reflection, to make changes to their teaching during the reflective practice phase. Participant 3 described his, apparently natural teaching approach, of using humour and class discussion to motivate students and help them develop strategies or make connections, while P17 introduced class discussion and reflection as part of a change in teaching practice during the course of this study. Teachers also mentioned providing students with opportunities to practice skills, strategies and techniques.

D1.P5 *"that's when I realised that they need to be doing it for themselves and that's how I've changed my teaching practice and they deliver the theory to the rest of the class in groups"*
D1.P5 *"we're taking this collaborative approach... And we find the kids are helping each other and they're managing to jump quicker from site to site and they actually find a language they can understand..."*
D1.P3 *"We use newspapers and they have to write a report for me every week. I pick out some kind of newspaper clip...with practice, and I go over it, and we talk about it, and we have a laugh...they pick out some of the language... now that works, eventually, the kids become much more confident in the reading..."*
D1.P13 *"we talk about the fact that they quite often come across words that they don't understand, they copy them out and they don't understand them, this need to understand what they're reading... putting it into their own words is a very important stage of that thought process, that engagement with the text by having to do that"*
D1.P9 *"I'll give them what the learning outcomes are, give them some*

*resources to find out about it and then bring them together at the end to check that they have learnt it...It's more a formative assessment idea"*
D2.P17 *"now that we have added this reflection into the lessons and the chance to improve on the mistakes they've made in the past, I think we are already bringing in information literacy"*

During the second discussion groups, participants were asked whether any of the tools or frameworks from the information profession or strategies used by participants were useful. Although teachers recognised some value in the cyclical, iterative models (Moore, 2002, p.36; Becta, undated) or the framework of skills (Barrett & Danks, 2005), they also had reservations. Some saw the models as being a useful means for students to understand the processes involved in using information, while others saw the value of frameworks as developing staff awareness. Yet others felt the models to be too simplistic for such a complex subject: *"I think what your list* [Appendix E] *showed was perhaps an over-simplification of some of the models, you can't just put things in flow charts...it's getting the right kind of social interaction within class"* (D2.P1).

Teachers generally commented on the reassurance they got from reading other participants' comments but very few picked up on specific strategies or opinions voiced. Only a few teachers expressed interest at some of the current information literacy research where affective elements, prior knowledge, task setting and student expectation of the task are considered key factors determining effective development of information literacy.

The majority of participants were positive about the opportunity to discuss information literacy with colleagues and several admitted that they had not really considered how students handle information before the group discussions. For some teachers this was the start of further reflection and observation; these participants saw not only the relevance for their students but also how information literacy could be related to other professional activities they were involved with and began to see connections with their own prior knowledge and understanding.

D2.P7 *"I'm aware of my shortcomings, and it's made me sort of realise what I could do...if I had the time"*
D2.P4 *"When I give projects and some of them fail I don't then tell them how to do it better the next time"*
D2.P6 *"I think it's been there all the time but it's [the study] brought it to the surface really and it's made me personally more aware, and will maybe make me more directed in what I'm doing"*
D2.P14 *"I definitely have not before sat down and thought about the different aspects involved in what I had always seen as a simple task of going and getting information."*
D2.P17 *"It's definitely made me more aware of what is going on in terms of the processes going through the students' minds"*

Throughout the discussions information literacy was discussed in relation to other learning and teaching factors suggesting that it is difficult to isolate from, say, social interaction. Teachers took individual approaches to the way they linked information literacy with other priorities in their teaching practice and the examples quoted reflect their personal experiences. Looking at the language teachers use to describe their classroom activities and their strategies, it became apparent that some teachers reflected constructively on how information literacy relates to their teaching and student learning, and these teachers also appeared to be more

confident to try new approaches and encouraged student discussion and involvement in the classroom.

Teachers recognised the complexity of the subject and several suggested that implementation of information literacy skills development would require additional professional training both in schools and at pre-service levels. Only a few teachers saw opportunities to pursue their understanding of information literacy in their current overcrowded timetables, while others found it difficult to relate information literacy and its potential benefits to their own classroom practice. This might in part have been due to their embryonic understanding of the subject at the time of the study. However, as section 4.6 reveals, teachers did feel that there were a number of constraints which would limit their ability to address information literacy.

## 4.6 Information literacy and educational context

This section looks at how teachers viewed information literacy in relation to the current teaching and educational climate: problems with overcrowded curricula, pressures of accountability, and conflict of implementing cross-curricular activities through subject disciplines. The educational setting was seen in terms of conflicts rather than opportunities for developing information literacy.

Teachers expressed the commonly felt constraint of overloaded curriculum content and formulaic exam structure on developing information literacy. They felt the timetable was too tight in the majority of cases to allow time for developing information literacy, although P17 did confess to cutting content in order to make room for constructive reflection and making students aware of the processes.

> D2.P4 *"I would like to… give them the chance to develop their own skills but we just don't have the time."*
> D2.P11 *"we don't necessarily have a lot of time built in for them to actually rectify those mistakes"* [not finding appropriate information or websites]
> D1.P3 *"we've got so much to do, such a short time to do it, so we do tend to cut corners"*
> D2.P17 *"We want to say 'Well, what did you do well? What went wrong?'...that ties in nicely with constantly evaluating, reflecting on your work and making student aware of the processes"*
> D1.P6 *"….my S5 class seem to be lacking any sort of opportunity…. the course is quite tight and it's just teacher-led the whole way through without giving them a chance to explore...."*
> D1.P1 *"in the case of science at least, it's more and more assessment driven...the more it is:' What's this part of the skeleton called?' or that kind of question, the more you tend to, and they want you to, give them the answers to those kind of questions, rather than try to do these kind of synthesising activities."*
> D1.P22 *"there's a problem in the certificated subjects, [they've] become a formulaic means to an end, the end being to pass the exam so you learn a process whereby it's predetermined how you are going to express a notion like exaggeration or bias and if you basically don't follow the rules, you're going to risk failure unless you're able to make a genuinely independent response."*

Exams require students to learn specific techniques in order to ensure the best results and there was a feeling that marks would not be gained from the type of

learning enhanced by developing information literacy.

Teachers were conscious of 'spoon-feeding' students in order to get through the curriculum and ensure positive results and they see students expecting to be taught only aspects of the subject which they see as directly relevant to their exams.

> D1.P2 *"I think the pressures of Standard Grade means that we over-assist"*
> D1.P16 *"So are you suggesting then that the pressure to make sure that they continue to achieve as well as they can at every stage actually means that we're less likely to help them develop information literacy?"*
> D1.P14 *"I think some of it comes from the whole educational process anyway because we spend such a lot of time literally spoon-feeding them to pass exams then suddenly you come to a part of the curriculum that requires you to give them a bit more independence..."*
> D1.P19 *"I find now that my questions have got more and more matched to exactly the answer that I want so the answer is fairly close to the question only a couple of words missing."*
> D1.P17 *"They do rely on being told the information or given the information rather than having to actually go and search for it themselves"*

Teachers also saw their own, rather than their students', reputation on the line and felt pressured to achieve high exam results from the government, school and parents: *"Plus it's your reputation that's on the line now, it used to be the case that the kid's reputation was on the line, now it's yours"* (D1.P1).

This appears to result in teachers being reluctant to take risks or to introduce new ideas in case they detract from their prime concern of getting through subject content: *"If I was just to set out with my 1st year class who I see once a week and say right, I'm really going to go for the information literacy thing, I can guarantee that their grades would plummet and then I'd be in trouble"* (D2.P10). However, it was also acknowledged that the education system does not encourage students themselves to make mistakes and yet, as P4 stated, making mistakes is part of the learning process: *"It's part of learning, isn't it, failing?"* (D2.P4).

As already indicated (section 4.3) there was little doubt that teachers recognised information literacy skills as important but the majority viewed the development of those skills as beyond the scope of their own subject remit: *"ideally we want to be using the [information] literacy in our activities rather than developing it, focusing on it"* (D2.P14).

Teachers needed evidence that any changes they made to accommodate the development of information literacy would contribute to achievement. Support from the school as a whole was also considered to be an important aspect if teachers were going to develop information literacy effectively with their students. Teachers thought that all staff should be aware of information literacy, that common goals, approaches and terminology need to be discussed and departments should know when and where in the curriculum others were developing and reinforcing aspects of information literacy. There was a general impression that the term 'information literacy' is not as important as mutual understanding of what the term means and how it might be supported within individual schools or departments. It was suggested that a whole school information literacy audit could be a way of establishing what aspects of information literacy are already being tackled and where reinforcement could be applied. However, they also expressed concern that

teachers have little opportunity to discuss whole-school initiatives and to reflect on generic skills. They commented on how the structure of different subject disciplines at secondary school, unlike primaries, detracts from cross-curricular teaching, consolidation and the transfer of generic skills. They also felt there was a danger that once a subject becomes core and subject to assessment or formal monitoring it can become a paper exercise to meet targets undermining the quality of learning and teaching.

D1.P8 *"I think the problem in schools is that it's not really discussed in any sort of obvious manner"*
D1.P16 *"the problem is that they finish that lesson with you and then go off to do another lesson and then another one and another one... if we knew what one another was doing [we could] try and apply that again, that's the difficult thing. And they get slightly different messages and slightly different language about it all, they just forget about it and then somebody else teaches them something slightly different."*
D2.P8 *"school is a pigeon hole situation where you've got to pass your Higher Geography or whatever, they're not always good at transferring across subjects."*
D2.P15 *"...being able to process information and find information, select information, it's going to be through all their subjects, but there's no actual exam in it, you know, so there you are fighting a bit of a battle there, with convincing teachers to give up time....."*
D2.P16 *"...by making something statutory and putting a monitoring process in place you often have the effect of a lot of the good practice disappearing and that's a big issue"*
D1.P13 *"There is a lot of overlap between what we are getting them to do and we are working all very much in isolation and I'm sure there won't be any policies that will be looking at how reading for information or selection of information is taught within a secondary school but we are all plugging away at it in our own different ways..."*
D2.P11 *"I imagine it being done at a much finer level, if everybody understands what it is you are trying to achieve at particular stages then if you can identify opportunities within your teaching where information literacy skills are going to be used for a particular topic or outcome, if you take a step back from that and think what skills do they actually need to learn..."*
D2.P17 *"perhaps not highlighting it as information literacy, I am not sure that that's entirely necessary"*

Finally some teachers were concerned that very practical problems in the way secondary schools and their resources are organised have a tendency to inhibit spontaneity of learning or students ready accessibility to explore resources at the point of need.

D1.P4 *"There's also a logistical problem as well, in that we don't have access in all our classrooms to computers...you'd have to book the library to use it as well, so there is a resource problem"*
D1.P3 *"...the spontaneity, there's things you suddenly think 'oh let's look at that' – oh no, you can't"*

## 4.7 Summary

The study provided a wealth of data which contributed to identifying teachers' conceptions of information literacy and issues relating to its integration into the curriculum. Although the reflection phase of the study did not develop into the interactive professional learning environment that was intended, there was evidence of growing understanding of how information literacy could be meaningfully incorporated into classroom activities. As discussions continued, the majority of participants expressed increased awareness of the complexity of the concept and an appreciation of some of the hurdles faced by their students.

Table 4, overleaf, gives a graphic illustration of the dimensions of variation of teachers' understanding of information literacy, showing the six different categories of conception that were identified from the data and how these were described in relation to four broad structural components or key elements discussed above.

Teachers' conceptions emphasised finding and understanding information, focusing on the skills required to process information. In addition, there was recognition of aspects of making meaning, critical thinking and independent learning associated with information literacy. Participants found it difficult to separate information literacy from learning and teaching, although also experiencing rather contradictory views about whether they were in a position to develop information literacy in their students. Discussion of the relationship with learning and teaching highlighted problems and issues that not only helped to clarify teachers' conceptions of information literacy but also explained some of the challenges faced by teachers when trying to encourage learning outside the scope of current curricula and educational priorities.

Participants agreed that information literacy is important for lifelong learning and that being information literate could contribute to affective elements of learning, could improve the efficiency in the way students handle information, and should contribute to greater achievement in terms of grades and increased knowledge. However they consider that the way the education system, schools and curricula are structured does not encourage the development of cross-curricular skills. They also believed that information literacy required whole school commitment and additional training to establish effective teaching practice. How teachers' conceptions of information literacy and the issues they described relate to current thinking in the information profession is explored in Section 5.

**Table 4: Dimensions of variation of teachers' conceptions of student information literacy**

| Outcome Space | Categories of Description | Key elements – contextual factors or awareness structure, (how the contextualised phenomenon was described) | | | |
|---|---|---|---|---|---|
| | | **Student Context** | **Teacher Context** | | **Educational Context** |
| | | **Student competency, motivation levels** | **Activity focus or requirements** | **Classroom experience (priorities & sense of control)** | **Conflicts & external pressures** |
| | **Category 1 Finding** | Good at gathering information<br>Good at finding<br>Good at sharing information<br>Tendency to copy and paste<br>Preference for/ motivated by IT | Resource focus - how to use/find from library, books, Internet<br>Technology focus (in line with current educational directive)<br>Fact finding – practical focus | Easy to administer (high control)<br>Project work is 'good thing'<br>Motivational, makes a change<br>Little thought given to learning outcome/value | Project work is something that's done<br>No time for reflective practice |
| | **Category 2 Linguistic understanding** | Motivation, self-esteem dependent<br>Varying ability<br>Dependent on home/ primary | Understanding / affective focus<br>Task orientated<br>Basic literacy<br>Self-esteem | High priority, important for all that follows<br>Not always sure how to help / influence (low control) | Lacking basic literacy<br>Home, primary influence more important<br>Large classes – some left behind |
| | **Category 3 Making meaning** | Cognitive elements are difficult<br>Not all developmentally ready/able at same age<br>Not good at making links<br>Some have it, some don't<br>Motivation, interest dependent | Subject focus - make sense of information, making connections between old & new information<br>Cognitive focus – higher order thinking skills, e.g. synthesis, analyse, interpret, etc. | Not sure how to help / influence (low control)<br>Links for exam success high priority, knowledge low priority<br>Some more concerned or able to see way forward than others (reflective practice) | Spoon feed for exams<br>Teacher's reputation on line<br>Exams prescriptive<br>Exams don't reward knowledge |
| | **Category 4 Skills** | Don't see connection/ use/value for grades<br>Good at practical not so good at cognitive skills | Skills (rather than subject) focus – (practical & cognitive)<br>Opportunities for skills development / practice | Low priority for subject / exams (although priority shifted during discussion)<br>Some control | Whole school/dept need to be involved<br>No time to concentrate on skills<br>Requires changes that involve risk taking, re-thinking, training, reflection, collaboration<br>Need evidence that it would be educationally beneficial (in terms of achievement) |
| | **Category 5 Critical awareness of sources** | Lack of understanding unless directly taught as subject<br>Unaware of pitfalls, think everything on web is fine | Subject / source focus - aware of bias, author intent, good sources for subject | Priority is dependent on subject<br>Some control | Lack of time<br>Requires taking risk of lower exam grades |
| | **Category 6 Independent learning** | Dependent on self-esteem<br>Student think they are independent | Lifelong learning focus - student capable with minimal teacher input | Considered important for 'real' education (high priority)<br>Unsure how to influence (low control) | Spoon feed to get through exams<br>Teacher's reputation on line |

# 5 DISCUSSION

This section begins by comparing teachers' conceptions of information literacy with existing models and frameworks, revealing both similarities and some differences in interpretation. Many of the existing models have been developed by the information profession and the extent to which they are founded upon research varies. While teachers considered information literacy to be important, they described the concept as a separate set of skills to be mastered rather than a way of learning and teaching. They discussed its implementation in relation to challenges associated with the student, teaching and educational contexts. The section moves on to explore the context in which teachers described information literacy, in particular mediation on a day to day basis, planning at a school level, including collaboration with teaching and library colleagues and policy level decision-making, in relation to current research. The section concludes with a summary of some of the issues highlighted during the study that are worthy of reflection when educationalist consider how to develop effective strategies to enhance the information literacy of school students.

## 5.1 Comparison of teachers' conceptions with existing models

This section considers similarities and differences in the way teachers and information professionals describe information literacy. Teachers in this study identified information literacy in six broad categories: finding information, linguistic understanding, making meaning, skills, critical awareness of sources and independent learning.

There are numerous models and frameworks describing information literacy; many have similar origins but all are slightly different. The comparison here focuses on, but is not restricted to, just a few indicative examples. The CILIP framework (CILIP, 2004; Armstrong, et. al., 2005) is the most recent UK example which attempts to look across formal education and informal community learning sectors and reflects the information professional environment in which it was developed. Information Power (AASL & AECT, 1998), which outlines the US standards for information literacy for student learning in schools, reflects the over-arching aims and principles of the K-12 curriculum. Seven Faces of Information Literacy (Bruce, 1997) considers university professionals' conceptions of information literacy and emphasises the importance of information literacy for knowledge building. Kuhlthau's (2004) information seeking process introduces the affective elements of searching for information, the anxiety, confidence and satisfaction experienced during information activities. Although these frameworks have developed from differing contexts and are not entirely comparable, it is worth looking at the variety of ways in which information literacy is approached and how different elements are emphasised accordingly. It is also not intended as a comprehensive comparison and there are many other examples that are equally valid (Big 6 Associates, 2005; McKenzie, 2000; Marland, 1981; SCONUL, 2004 to name just a few). In the study reported here teachers were responding to their initial understanding of information literacy in relation to their classroom practice which reflects their current challenges in learning and teaching. In phenomenographic terms the subject was the teacher and the object was student learning, whereas in other phenomenographical studies examining information literacy the subject was the group under enquiry (university academics or students) and the object was information (Bruce, 1997; Lupton, 2004). Information literacy frameworks and models are the result of evolving theories, generally founded on research and observation in a variety of differing

contexts. Appendix I looks across a variety of frameworks highlighting similarities and interesting contrasts in approach. It is important to recognise that a comparative table such as this can only provide basic information and cannot illustrate detailed descriptions of what is intended by each element and the context in which frameworks were developed.

### *Information need*

The majority of information literacy frameworks begin with the information user recognising and understanding the current information need and this implies understanding the ultimate purpose and what the information task involves at any given time, for example the type of information required (depth of understanding, specific facts, differing opinions), and target audience for the information sought. Teachers did identify information need as a conception but the emphasis was less on interpreting the information need in relation to sources available and the required outcome, and was secondary to a more basic verbal and textual comprehension and understanding what the task required. Comprehension was recognised as a challenge for a number of students but also seen as fundamental for tackling any activity. The basic understanding described by teachers was seen as dependent upon any number of contributory factors, including family and primary school influences that teachers referred to and will also be influenced by affective elements and prior knowledge and experiences.

In research with senior secondary students there is evidence that understanding the information task is more complex than the frameworks initially suggest and there is a clear relationship between understanding the purpose of task in subtly differing ways and information behaviour. Limberg (1999) suggests that there is a relationship between students' perception of task requirements and successful completion. For example those students who understand the task as requiring an opinion based on assessing the evidence from all sides will tackle the task differently and use information in a different way from a student who understands the task to require a right answer (Limberg, 1999). Burdick (1996) indicates that many students *"perceived gathering information as the task most necessary to complete the [research] project successfully, rather than focus formulation, which Kuhlthau's model identified as the central task"* (Burdick, 1996, p.21). Many et als' research with upper primary aged students revealed three distinct perceptions of what a research task entailed: *"(a) research as accumulation of information, (b) research as transferring information, and (c) research as transforming information*" (Many, et al, 1996). Thus, teachers and librarians need to consider carefully how they want students to tackle any given information task and to ensure that the task is presented to students so that there is a shared understanding of what is expected. In turn there is a need to mediate the information handling process appropriately in relation to that shared understanding.

### *Finding information*

Much of the teacher discussions focused upon finding specific pieces of information from electronic or physical resources. The finding conception incorporated the need for users to understand how information is organised and presented, and teachers admitted that they make assumptions about students' understanding of, and abilities to use, resources. Knowledge of sources of information and understanding how to use them to find information appropriate for the task in hand are common features of the all the information literacy models and frameworks. The CILIP framework (Armstrong et al., 2005) emphasises search techniques (for example Boolean logic, search ranking) and the use of specialised information sources (for example abstracting and news services) aimed at professionals in specific fields.

The academic participants in Bruce's research expressed the conception of information literacy in relation to being aware of potential sources of information for their information needs and successful retrieval of information (Bruce, 1997). This knowledge and understanding is likely to be built up over a period of time and will constantly change within any given subject area. Information Power (AASL & AECT, 1998) remains more general considering the variety, and understanding the depths of coverage, of different formats, and adopting strategies for locating information appropriate for students in a school context. Although participating teachers recognised a need for students to find information, some questioned the need to teach complex search techniques when search engines are becoming increasingly user friendly. The major concern for teachers was students' inability to read for understanding and select relevant information from resources and many used a strategy of pre-selecting resources to help students focus on information required. To be an efficient and effective information finder requires the ability to draw on a variety of strategies that could be employed in different circumstances and these may not be developed if students are not given the opportunity to understand the relationship between subject discipline and potential resources. There are a number of facets of 'finding information' that need to be appreciated when considering how to approach any given information activity, for example mediators (whether teachers or librarians) need to be sure whether activities are set with the appropriate emphasis on understanding sources, extracting information or knowledge building in relation to the intended outcome and recognition that students may approach a task with a particular information stance that may not be appropriate for that particular outcome.

### *Critical evaluation*

Teachers identified the need for students to think critically about sources of information to evaluate relevance, recognise inaccurate or misleading information and understand a writer's stance. Teachers also admitted that they often circumvent this process by providing reliable sources rather than developing students' own strategies and awareness of how to evaluate information. This reflects the pressure teachers feel under to get through subject content in tight time schedules. The amount of attention teachers gave to developing student awareness of bias, opinion and writer's stance tended to reflect differing subject requirements.

Information literacy frameworks consider evaluation in a number of different ways. Evaluation, critical examination and reflection are needed throughout the information process, to ensure, for example, that the most appropriate resources have been located, the most appropriate information has been selected, evidence supports statements, that presentation is suitable for the target audience, etc. This includes the critical awareness that teachers were describing but also goes much further. Evaluation in the CILIP framework emphasises the ability to evaluate information found in relation to authenticity, accuracy, currency, value and bias in relation to the information need (Armstrong et al, 2005). Information Power sets out aspects of evaluating information in standard 2: "*the student who is information literate evaluates information critically and competently*", which states four indicators of student competency: the ability to determine accuracy, relevance, and comprehensiveness; the ability to distinguish between fact, point of view, and opinion; the ability to identify inaccurate and misleading information; and the ability to select information appropriate to the problem or question at hand (AASL & AECT, 1998, pp. 14-15). In addition, some frameworks include evaluation as a separate step at the end of the process to consider the effectiveness and efficiency of the whole process of finding, using and presenting information (for example, Big 6 Associates, 2005; Marland, 1981) and standard 6 of Information Power encourages reflection on the process as a whole in relation to independent learning and

knowledge generation (AASL & AECT, 1998, p. 29). In practice, reflection about information process in relation to the current purpose of an information task is not always spontaneous for inexperienced information users and may require mediation to help students recognise the significance of reflection to ensure high quality outcomes. Some of the newer figurative models ensure reflection and evaluation are central to the cyclical process (McKenzie, 2000; Moore, 2002) and it would be worthwhile for schools to consider the extent to which students would benefit from understanding these models.

### *Organising Information*

There are aspects of information literacy as represented in some existing models that participating teachers did not discuss or develop in any significant manner. Several of the frameworks identify the need to maintain records for reference during the current or future information tasks. The CILIP framework (Armstrong et al, 2005) and Bruce's Seven Faces Model (1997), for example, outline the need to understand how to store and manage findings in a variety of different physical, mental and electronic formats. Information Power (AASL & AECT, 1998) places organising information under accurate and creative use of information, in terms of making notes and keeping them available for later reference. This relatively narrow interpretation is often adopted in curriculum tasks as an opportunity to try various note-making techniques with little emphasis placed on the importance of these notes when information is manipulated, tasks are reworked and the foundations of knowledge are being developed by individuals. Knowledge is constructed in stages as different pieces of information begin to fall into place and, if reflection on previous information is to be encouraged, then systematic recording needs to be developed to enable effective retrieval. Teachers in this study only made brief passing reference to organising information and note-making, although this aspect of handling information needs to be considered if students are to be encouraged to constantly reflect on and evaluate information found in relation to purpose. In schools, jotters are used in this way, although teachers did indicate that students are often reluctant to refer back to previous notes. This may reflect the way the curriculum has bursts of concentrated activity on one aspect of a subject and moves rapidly on to new topics. Educationalists discussing thinking skills (Nisbet & Shucksmith, 1986; Wilson, 2000) and information literacy models incorporating on-going reflection during the research process (Becta, undated; Kuhlthau, 2004; McKenzie, 2000; Moore, 2002) stress the value of metacognitive aware of one's own learning. Thus, it is likely that students might benefit from understanding how knowledge is constructed and the need to re-evaluate their understanding of a subject as they interact with new information. If understanding the need to go back to previously accessed material is encouraged as good practice, students will also need strategies to store, maintain and update that material.

### *Ethics*

Ethical issues associated with the use of information are more prevalent in recent information literacy frameworks but were only touched upon by teachers. In general, teachers talked about their concern over students' tendency to copy and paste, and they recognised the need to cite references and the implications for teaching copyright. Information Power sets out information literacy as a prerequisite for independent learning and social responsibility (AASL & AECT, 1998) and Todd and colleagues express knowledge values as part of their Essential Learning Foundations (Todd, Kuhlthau & OELMA, 2004). However, unlike some of the frameworks (AASL & AECT, 1998; Bruce, 1997; Lupton, 2004; Todd, Kuhlthau & OELMA, 2004), teachers did not discuss broader aspects of the relationship between society, values and information, despite its potential value within certain subject

disciplines.

### *Communication*

One common aspect in information literacy frameworks is the presentation, communication or dissemination of information as knowledge. Communication is a complex phenomenon and is described in differing ways in existing frameworks. CILIP sets out examples of communication as understanding the advantages and disadvantages of different communication channels; participating effectively in collaborative publication; understanding appropriate writing styles; and knowledge of techniques and conventions when reporting (Armstrong et al, 2005). Others state the communication aspect as the dissemination of information and ideas (AASL & AECT, 1998; Todd, Kuhlthau & OELMA, 2004). However, in project work in schools this is often interpreted as a simple one way illustration of facts found rather than a dialogue to discuss new knowledge or interesting interpretations in the light of new information found by students. Although in this study, one teacher did mention communicating information to inform others, other teachers used identification of audience as a strategy for focusing students' attention on selecting relevant information for inclusion in any final product. However, there was little discussion on how significant purpose, questions posed, target audience and presentation format are in influencing the whole information activity, including the search strategy, selection, note-making, organisation of new information, analysis, and final presentation of work.

### *Information process*

The variety of practical skills and cognitive competencies required to handle information was identified as a separate conception for secondary teachers because it appeared to underpin all other aspects of information literacy, although in reality differing skills are also associated with each of the other conceptions. Other frameworks incorporate an assumption of skills, abilities and competencies within each of the different aspects (Bruce, 1997; Kuhlthau, 2004; Lupton, 2004) and describe information literacy as a process made up of steps each requiring the application of skills (Marland, 1981; Big 6 Associates, 2005). Teachers were surprised by the range and extent of skills they identified as being involved in handling information although they did not necessarily consider all to require explicit teaching or learning. When discussing project work, however, they did tend to assume the skills would take some form of systematic process.

Traditionally information literacy models and frameworks have been presented in linear form which tend to suggest a simple step by step progression through a sequence of information phases, encompassing a few identified skills (Herring, 1999; Marland, 1981). More recent models present the information process as a cyclical or spiral of inter-related steps with student reflection or teacher mediation as central to the process (Becta, undated; McKenzie, 2000; Moore, 2002). Teachers discussed information literacy as a series of skills when discussing project work but in other information activities skills were described as separate entities but related to each other, and to learning, in complex ways which appeared to be task, and therefore context, dependent. This represents a more complex picture than is apparent from the existing models and framework. The all embracing nature of information literacy frameworks inevitably gives a simplistic impression of the skills required when handling information and it is only when professionals begin to examine information behaviour in greater depth that the complex nature of inter-related skills becomes apparent.

### *Affective elements*

One model based on research with students progressing from school to university and the work environment considers the affective elements associated with information seeking behaviour. Kuhlthau's (2004) information seeking process identified different affective elements with different stages of the information process, for example the initial anxiety experienced while the task remained unclear, the sense of confusion and frustration when information is abundant and focus is undefined, the clarity and sense of direction that accompanies focus definition and the ultimate satisfaction or disappointment with the final outcome. These feelings associated with the different stages of the information process struck a chord with those teachers who had experience of undertaking higher degrees. As already mentioned in section 4.3, teachers associated information literacy with student confidence in terms of its contribution to learning and mentioned frustrations students encounter when they lack the skills to handle information efficiently. Despite acknowledging affective elements within the information process, only a few teachers felt that understanding these stages might help students recognise their frustrations as a common part of the research process and thus encourage them to keep going and progress to the next stage.

### *Information use*

Teachers' 'making meaning' conception related to the cognitive processes, skills and techniques that are required for students to understand information in the context of existing subject knowledge and to make links between prior knowledge and new information. Meaningful use of information within a given context is often given cursory attention in the existing information literacy frameworks which include broad categories, such as selection or collection of information (Kuhlthau, 2004), and work with or exploit results (Armstrong et al, 2005). This may indicate a professional boundary between the information gatekeepers and those requiring information for their professional life. Bruce's university lecturers on the other hand, placed emphasis on knowledge construction and extension indicating the significance of knowledge building in their professional capacity. Those frameworks concentrating more extensively on use of information in school-aged students include interpretation, analysis and synthesis as part of the process (for example, AASL & AECT, 1998; Marland, 1981; Moore, 2002; Todd, Kuhlthau & OELMA, 2004) because this is also of particular developmental relevance for this group of information users.

When considering information literacy in relation to project work, teachers expressed it as a process that required the application of a number of skills of differing complexity, from lower order finding skills through to higher order skills associated with summarising, synthesising, organising information to a satisfy a stated need (P8, 14, 1, 17). Other participants appeared to have doubts initially whether analysing and interpreting information was part of information literacy (P2, 3, 7, 21); they were not convinced that handling data within their subject was part of information literacy and one teacher (P21) described it as information problem solving. However, after continued discussion, teachers did begin to think interpreting information and data might be part of information literacy but remained hesitant. One ICT teacher (P12) articulated a clear distinction between data, information and knowledge within computing as a discipline and acknowledged that handling data could be one strand of information literacy with the other strand referring to the 'making meaning' conception. Teachers began describing information literacy as a separate concept from their subject discipline but as discussions progressed there was less clear distinction and no certainty of where any boundaries might lie in terms of generic skills of handling data and information

and handling subject specific data to solve problems or provide evidence.

Although teachers expressed the importance of making sense of information and difficulties with the cognitive skills required to manipulate information, it would be useful for schools communities to debate further the relationship between information, its use in various curriculum tasks and knowledge building.

### *Knowledge building*

Some frameworks focus on resources (for example, Armstong et al, 2005) and application of information takes the form of task completion. However, in other frameworks developed from research from the user perspective application of information is more closely associated with information transformation and knowledge building (for example, AASL & AECT, 1998; Bruce, 1997; Lupton, 2004; Todd, Kuhlthau & OELMA, 2004). As already indicated (see section 4.3), knowledge construction and extension was not evident as a significant aspect of information literacy amongst participating teachers and this may reflect the early stages of teachers' thinking about information literacy. Another element to this may be the fact that many information-related activities in schools, particularly project work, encourage *transfer* rather than *transformation* of information, i.e. the use of resources rather than the use of information. The influence of task planning and setting on the way information is sought, handling and assimilated was not readily appreciated by participating teachers. While one teacher indicated that if students were required to know something for assessments the information was given to them, another did suggest that as students became more information literate more 'open' questions could be asked of them. On the whole knowledge building seemed to be considered separate from information literacy.

### *Independence*

Independent learning is the goal of information literacy and this is clearly indicated in the way Information Power (AASL & AECT, 1998) divides the information literacy standards into three categories: information literacy, independent learning and social responsibility, with standards in each category building upon the previous one. Participating teachers also identified confident application of skills and strategies in order to conduct independent, relevant and successful enquiry or research as an important aim of information literacy. Some frameworks focus on a process of using information skills with an implicit recognition that understanding and developing these skills is vital for information literacy and thus independent learning (Marland, 1981; Big 6 Associates, 2005). Other researchers describe different aspects of what it means to be information literate and thus independent information users (Bruce, 1997; Kuhlthau, 2004; Lupton, 2004). Much of the research conducted in the information world focuses on individuals who might be considered to be information literate at least in certain contexts: university lecturers (Bruce, 1997), senior high school students (Limberg, 1999), first year university students (Lupton, 2004) and professionals in the workplace (Kuhlthau, 1997). Students in school, by definition are still developing the skills to become independent users of information. In contrast teachers in this study began their discussions with an assumption that students have the skills to be effective and independent information users. However, they began to express concerns that not all students are equally capable of handling information without support in some situations or at certain developmental stages but were less clear about how to help students become independent learners and the relationship between effective information use and independence. Independent learning was a key goal for participating teachers and was clearly identified with information literacy.

### *Teachers' reactions to existing models*

During the reflection phase of the study, teachers were introduced to a number of frameworks, models and findings from research and were given printed and electronic references to materials (summarised in Appendix D), which were intended to stimulate reflection. However, there was no evidence that any teachers explored these resources in any depth. When asked directly about them, there was neither disagreement nor debate about the validity of other interpretations of information literacy and participants generally accepted other interpretations as valid but not necessarily equally applicable to their own context. During the reflective phase of the study, one teacher began to develop her own ideas about how students should be introduced to information handling which concentrated initially on reading for understanding and making sense of information in relation to subject knowledge, and then progressing to an awareness and appreciation of different resources. Sharing the various stages of the information process with students was viewed by many teachers initially as a good idea, several of whom indicated that Moore's model (2002), with reflection on the process at the heart of the model, was particularly useful. However, some teachers began to question the value of such simplistic models as they developed an appreciation of the complexity of information handling.

Although teachers generally responded positively to the frameworks, models and research outlined to them during the reflective phase of the study, very few participants expressed the intention of using any in the foreseeable future. They tended to view information literacy as a separate subject rather than seeing it as a way of teaching and thus integrating it within their own subject. However, four of the research participants who attended the dissemination event (summarised in Appendix J) expressed increased understanding and P2 did state she was using Moore's (2002) model in revised planning. Again, this suggests that absorption of new ideas is a slow process that requires active participation and until the subject is studied in depth the significance of some of the theory behind information literacy frameworks is unlikely to be recognised. At the start of the study teachers' understanding of information literacy was closely associated with research projects and finding information and not with the equally crucial skills of identifying and selecting information from within textual passages, a vital part of all classroom work, as reflected for example in the Scottish 5-14 curriculum guidelines. As the study progressed, teachers began to see the concept in broader terms and recognised that they are already doing a great deal of what is covered in the frameworks but without focus. Some teachers still seemed unsure how to introduce aspects of information literacy and were concerned about alienating students by introducing them to skills which they thought student would perceive as irrelevant, while others began to see ways of implementing changes to focus on specific skills development within subject teaching.

The models and frameworks referred to in this section are examples of the many and differing ways information literacy has been described, all of which have the potential to contribute to our understanding. Participating teachers thought information literacy was important and felt that discussing the concept with colleagues had been valuable in identifying problems and issues. Discussions had also highlighted assumptions made about students' abilities to handle information and raised questions about how best to develop information literacy within their current teaching practice. A shared understanding of what information literacy means for professionals at a local level is likely to be as important for establishing information literacy in the curriculum as agreement on the value of existing models and frameworks. It is also clear from the study that teachers develop an understanding of information literacy in relation to their own priorities and practice.

During the course of the study ideas begin to merge, shift and re-formulate and the slow process of learning about a new concept began to take shape, more obviously in some individuals than others.

The following sub-sections look beyond the conceptions to consider how the findings relate to learning and teaching and recent information literacy research, and this includes the day to day mediation of information literacy in the school environment, collaboration with teaching and library colleagues and decision making at policy level.

## 5.2 Information literacy and learning

The previous section compared teachers' conceptions of information literacy with existing models and frameworks from the information profession. Information literacy skills are embedded within curriculum documentation and many activities that teachers undertake incorporate opportunities for students to practice and develop skills. The fact that information literacy frameworks have been around since the early 1980s but have not made a significant impact in school teaching and learning suggests that frameworks alone are not enough to promote change. This study suggests that there are a number of issues that need to be considered both at the policy and curriculum development level and at a classroom, departmental or school level in order to develop opportunities for students to become information literate. This section discusses the findings in relation to learning and some of the current research that has examined aspects of information literacy beyond simplistic models.

### *Information literacy and task setting*

A relationship between task setting and information seeking behaviour is beginning to emerge from a number of studies in information literacy. The type of questions posed, whether by the teacher or the students themselves, will influence the type of sources of information used and the way information is selected and interpreted. Fact-finding questions tend to ask 'what?' whereas 'why?', 'how?' and 'which?' questions require answers of a higher cognitive order (McKenzie, 2003). Fact-finding, although important in some contexts, tends to lead to limited information seeking behaviour, whereas, questions which force students to consider a number of options help develop more critical approaches to sources of information (Limberg, 1999; McKenzie, 2003). However, some students may need help recognising the significance of the type of questions posed, the type of information that is required to answer them satisfactorily, and the most appropriate ways of communicating those ideas in a logical structure.

The importance of prior knowledge as a significant factor in determining information literacy has been recognised in research by Lemke (1998); Limberg (1999); Todd (1999); and Smith & Hepworth (2005). One teacher stated that she had only just realised how much knowledge of a subject was needed before new information starts to make sense and you can begin to build new knowledge. Other teachers implied an understanding of this when they discussed the need for wide vocabulary to pick up synonyms when working with information and the importance they placed on the home environment for developing general knowledge and the desire to acquire knowledge. However, the implication was that it was only during discussions that they began to consider the significance of this in terms of how students handle information.

As already suggested, there is also research that identifies variations in preferences

for seeking and using information, those who look for a 'right answer', those who look for a 'clear point of view' and those who favour exploration of ideas (Burdick, 1996, 1997; Limberg, 1999). Thus, students' interpretation of what is required from a task influences the type of information sought and selected and whether facts are presented, problems are solved or opinions and decisions are made as an outcome of the information activity. The extent to which the stance taken on seeking and using information is influenced by personal characteristics, gender, prior subject knowledge or understanding of the requirements of the activity set has not been fully explored but raises issues about how mediators guide students in their information seeking behaviour in relation to expected outcomes.

At least initially, teachers tended to associate information literacy with project work. Research projects are encouraged in the curriculum, and are seen as a means of motivating students because they provide a different and freer environment for learning: *"It sounds like good fun to go and do things and find stuff out and being more independent."* (D1.P19) or because they provide students with a sense of achievement: *"It gives pupils a chance to do something or it gives them the chance to produce an end product which is quite nice"* (D1.P11). The learning emphasis of these activities tends to be on tangible outcomes in terms of gathering pieces of information and finding facts rather than on skills development during the process. However, a few participants did question the value of this type of activity and saw the need for more critical reflection by teachers on the purpose of setting project work and the intended learning outcomes of such activities. They recognised that some students do not have sufficiently developed skills or maturity of cognitive processes to undertake such a complex task (P3, P14, P13) and P14, in particular, saw no point in setting project work without ensuring some of the underlying skills required for successful completion were sound.

Teachers saw parallels between information literacy and higher order thinking skills and recognised that even senior students find these difficult to grasp. Information literacy is inextricably bound up with learning. There was general agreement that the higher order skills required mature or advanced development and would not necessarily be within all students' capabilities at any given time. Participant 3 expressed this in terms of Piaget's developmental stages, while P4 felt there must be some way of employing Feuerstein's theory of mediated learning (School A.D1) to enable effective student support. Participant 14 mentioned how undertaking the reflective log had enhanced her understanding of constructivist theory (School F.D2). Much of the information seeking behaviour research is based on constructivist learning theory, Vygotsky (1978) being one major influence. McLellan & Soden's (2003) research with Chartered Teachers suggests that teachers enrolled on Chartership Programmes do not necessarily have thorough grounding in constructivist theory, and this may limit effective implementation of information literacy.

Although 'making meaning' was described in terms of making sense of new information in relation to prior subject knowledge, passing exams came across as more important in school education than the goal of building knowledge and the suggestion given was that exams could be passed with little depth of knowledge. Thus, the conceptions of 'making meaning' and 'critical thinking' were less about developing knowledge, forming opinions, and making decisions than about understanding and linking subject specific content to exam requirements. Whether this is appropriate for school education is a different debate. However, when discussing information literacy it is legitimate to ask whether enough activities are being set to encourage the development of the higher cognitive processes, such as comparing, contrasting, interpreting, developing arguments and drawing conclusions. If this is being done in the classroom but not in a library and

information context is that sufficient, or do students and staff need to be aware how this might fit into a broader understanding of information literacy of resource awareness and selection and appropriate communication?

Teachers discussed transferability of skills between subjects as being a problem for students and yet they also acknowledged that students do bring skills with them, such as technical capabilities, either from home or other subjects. Implicit in this is the need to mediate effectively with those students who struggle to make the connections between information activities, skills and strategies, cognitive processes and high quality learning outcomes. This suggests that transferability is connected to skills proficiency and that the issue is to do with providing sufficient mediated opportunities to reinforce aspects of information literacy in environments that encourage understanding and knowledge building. Without these opportunities it seems likely that only '*some of the brighter kids*' (D2.P19), whose confidence, knowledge and understanding enable skills and strategies to develop as required, will become independent learners and users of information. It is important to remember that even experienced information users find some aspects of information literacy challenging in new and unfamiliar contexts (Kuhlthau, 1997) and not all professionals expect to use all the information literacy skills identified in the models to do their job (Cheuk, 2000, p.184). However, being information literate may provide the confidence to evaluate and select from a suite of potential strategies, including seeking help from experts. It was apparent during discussions that teachers did not understand what input from them was needed to achieve the less tangible thinking skills and felt there was little they themselves could do to develop competencies. Participants were unsure how to develop information literacy effectively within the constraints of subject curricula and current educational priorities. Some teachers seemed reluctant to acknowledge that there might be support strategies they could put in place to help all students become information literate.

### *Information literacy and mediation*

One of the outcomes of taking part in the study was a greater awareness by teachers of how students were interacting with information in the classroom and those participants who observed and reflected on the information behaviour of their students began to consider ways of implementing changes in their teaching to enhance student learning and information experiences. These teachers appear to have gained more satisfaction from taking part in the study because they saw potential for improved student learning, if only on a small scale, while others appeared to be more overwhelmed by the scope and variety of skills that need support. However, close observation of student activity and using their own information literacy to locate, select and evaluate potential sources of information to support their actions requires time and commitment which teachers clearly perceived to be stretched to capacity. Participants generally agreed that for optimum value all members of teaching staff need to be aware of information literacy as a concept and for the whole school to adopt similar approaches and understanding for implementation with students.

Kuhlthau (2004) discusses the importance of timely and appropriate mediation by librarians during the information seeking process but this is equally applicable to teachers who support students working with information. Kuhlthau develops her research on the differing levels of mediation and zones of intervention (Kuhlthau, 2004, chapters 7 & 8) from Vygotsky's theory of zones of proximal development (Vygotsky, 1978). In order to mediate effectively and help students at all stages of their development to make connections and overcome immediate hurdles, teachers and librarians need to be fully aware of the different skills and potential

misconceptions that students might encounter. In addition mediators need to be prepared to observe students at work, to check work in progress (such as resources found and notes taken) and to correct and guide as necessary. Evidence from this study and previous work (Williams & Wavell, 2001) indicates that when students are involved in information-related activities, timely mediation for skills development is an area that teachers and librarians find difficult to implement.

In the previous section (5.1) discussion about teachers' conceptions of information literacy and those portrayed in a variety of frameworks highlighted a number of similarities and differences. The comparison serves to illustrate further the complexity of information literacy and the potential for differing interpretations representing differing contexts. The widespread research and development of frameworks has provided a number of alternative approaches to visualise and develop information literacy and these can contribute to our understanding. However, this study reinforces the notion that observation and reflection of how students handle information increases understanding at an individual level and active discussion with colleagues enhances a shared understanding. It is likely that this is as significant to ensure future changes in practice as following established frameworks, and research findings are then more likely to make sense. While stressing the need for individual reflection and collaborative discussion, it is also important to consider the extent to which students also need to share the understanding of information literacy as a concept in order to encourage connections to be made between teaching and learning.

***Information literacy and collaboration***

As already discussed in the previous sections, teachers felt the need for shared understanding of information literacy amongst themselves but admitted to seeing this as difficult given time constraints, individual commitments and barriers posed by physical location of departments. Most teachers make use of informal contact with colleagues during breaks or in passing for exchanging ideas and sometimes for collaborative planning. However valuable these chance encounters and brief informal meetings are, it is likely that more time and structure is needed to provide the depth of understanding for schools to tackle information literacy on a wide scale with shared aims and objectives. Teachers recognised the need for support and input from senior management to accomplish fundamental changes in approach to teaching and learning, while also acknowledging that acceptance of new ideas requires individual commitment from teachers that only comes from seeing practical benefits for their own students. What was noticeable from discussions was opportunities identified by individuals where teachers could either build on each other's work or collaborate in a small way with projects, for example, English department working with science on animal investigations. In this way some teachers were selecting practical working arrangements with trusted colleagues; other teachers saw this form of collaboration as the way forward with the hope of gathering interest from others as activities prove successful.

Teachers from three participating schools (Schools C, G & I) openly viewed the school librarian as key in taking information literacy forward in the school. Most schools recognised a role for the school librarian in providing resources and helping students during research projects but teachers also expressed differing understanding of the extent to which information professionals might be in a position to support teachers in their professional development or in co-ordinating cross-curricular initiatives such as information literacy. In Scotland, school librarians are qualified to degree level or beyond and as Chartered Librarians will be expected to keep up to date with current professional thinking, which includes information literacy. In England, where schools employ a school librarian, their

professional status will range from untrained and inexperienced to highly trained and very experienced. In practice, teachers will encounter school librarians with a wide range of skills and expertise, knowledge and interests and teachers will also be influenced by their past and very mixed encounters with school, public and university librarians. It is not surprising then that teachers may not automatically engage in collaborative work with the school librarian to support student use of information.

Research from the USA indicates that for effective impact on student learning teachers and librarians need to work collaboratively to support information literacy and reader development (Lance, 1997; Zweizig & Hopkins, 1999). Collaboration is described in school library literature as a range of interactions between teachers and librarians, with the basic levels being an awareness of each other's roles and responsibilities, through co-ordinated but separate support inputs, to the ultimate trusted, equal and integrated professional contribution to student learning (Zweizig & Hopkins, 1999; Loertscher, 2000; Montiel-Overall, 2005). While evaluating the impact of the Library Power initiative's success in promoting student learning through the use of library collections and information literacy, Zweizig and Hopkins acknowledged that even with staff commitment to the initiative no schools achieved full shared responsibility and understanding for the planning and delivery of student information skills, and brief communication or working with parallel goals was much more common (Zweizig & Hopkins, 1999). This would suggest that two different professions working in collaboration for a shared goal is not easy to achieve and, despite recognition of the importance of shared understanding, the teachers participating in this study did not give any clear impression that collaboration within schools necessarily operates at a high level of understanding either.

Librarians are in a unique position within a school to support teaching and learning and co-ordinate information literacy activities. They see students working with information when they visit the library and are aware of what other teachers are introducing and developing in the way of information literacy skills in the library context at least. However, although information professionals have raised the importance of information literacy as a concept, until the subject is understood in relation to learning, practitioners on the ground tend to use the frameworks in discrete courses that are neither fully integrated into curricular activities nor fully supported with true understanding of the research and theoretical underpinning that lies behind the concept. In previous research school librarians, while able to direct students on effective information literacy skills in theory, were not prepared in practice for the individual support students required to overcome hurdles and to suggest alternative strategies and skills (Williams & Wavell, 2001). In addition, it is likely that not all librarians will have studied educational theories such as constructivism upon which information literacy frameworks are based and are not necessarily making connections between information literacy and the curriculum in language that teachers can relate to. Maclellan and Soden (2003) would argue that teachers studying for Chartership in Scotland are not necessarily fully acquainted with the educational theory that the curriculum has been founded upon either. Thus both teachers and librarians may need to update their professional practice but this might prove easier within a dedicated local group focused on a cross-curricular activity such as information literacy. Indeed the discussion group in school A had taken this approach to share experiences and expertise focusing on a range of professional learning.

Effective collaboration is needed to ensure that both teachers and professional librarians are aiming towards the same shared vision to equip students with the skills to use information to make decisions and solve problems in school and in all other avenues of life. To achieve this level of collaboration teacher and librarians

need to develop an information literate culture within their own school environment with all individuals focused on complementary objectives. In turn this requires personal commitment, support from senior management and changes in working practice to enable flexibility in time and curriculum.

### *Information literacy and policy making*

A common complaint by teachers was the pressure they felt to focus on inflexible subject content and exams to ensure students had the best chances to obtain optimum grades. Teachers expressed their frustration that exams and assessment hinder learning, especially the development of skills and spontaneous enquiry. Recent curriculum reviews (for example, Scottish Executive, 2004; DfES, 2005) indicate a less prescriptive approach in some areas but teachers expressed the need for time in the curriculum for reflection and practice, and recognition that risk-taking plays an important part in the overall learning process. A few teachers indicated that inspection reports provided the impetus for changes in teaching and learning in schools. Although HM Inspectorate of Education in Scotland and Ofsted in England provide guidelines for school library inspection (DfES 2004; HMIE, 2005), thereby giving credibility to the support role information resources can play in enhancing learning, inspectors are not looking specifically at the relationship between information literacy and learning. Other teachers had misgivings that inspection reports and national policies do not necessarily have the desired effect of changing core beliefs and practice which is more likely to come from committed groups of individuals who have worked together to achieve mutual understanding.

New educational initiatives could provide useful means to support or encourage information literacy, for example formative assessment (discussed by P6, 7, 14) and collaborative learning (discussed by P5) both of which are at the heart of constructivist, enquiry-based learning. However, teachers expressed the need, not only for time to attend training courses and CPD sessions that introduce new ideas, but also the time to familiarise themselves with those new ideas in relation to their own professional practice and to explore potential for integration within their own priorities and classroom practice. The need for training opportunities was discussed by several teachers, both in the form of CPD and in-service activities, and at teacher training level. In addition, teachers need to have some basic understanding of how information literacy might help teaching and learning before they will buy into any training offered by external providers.

## 5.3 Summary

Information literacy was a relatively new concept for the majority of participating teachers, many were not familiar with the term and had not previously reflected on information-related activities and student learning. It is common, even in the information profession where the term has been used for many years, for first thoughts to focus on technology and finding information in text format. The teachers in this study were no exception. As the discussions and study progressed teachers began to concentrate more on understanding, both instructions and information itself, on reading literacy and students' need to be able to select relevant information from text they understand. Emphasis on finding and understanding sources discussed by teachers reflect the major issues that participants face working with students in the classroom, for example potential challenges of using the Internet for information-related tasks. Critical thinking about resources and making meaning from information in relation to the subject discipline being taught were also identified by participants. Skills development permeated all discussions, as did the conception of independent use of these, often

unspecified, skills to do research. Communicating to others and problem solving were also mentioned but with less conviction. Appendix I shows just four of the current conceptions of information literacy to illustrate the similarities and differences between frameworks from the information profession and conceptions found in this study. This comparison of conceptions illustrates how interpretations variety in emphasis, influenced by the context in which information literacy is focused and practised. By the end of the study there was evidence that teachers were aware of the potential for further exploration, observation and discussion, and a shift or greater fluidity had taken place in the way information literacy was described by teachers, sometimes reflecting apparent contradictions.

Some of the findings and issues raised in current information literacy research were not discussed in any depth by participating teachers in this study and this is likely to reflect the embryonic stage of teachers thinking about information literacy. However, current research is useful in highlighting a number of aspects of information use that are worthy of consideration in relation to learning. The following is a summary of some issues highlighted by the study that school communities, collaborative partnerships and individuals might consider when seeking to establish their own frameworks for information literacy.

***Mediating the information process***

- Information literacy encompasses a wide range of skills and experiences that are not necessarily illustrated in information models and students will bring a range of differing competencies and experiences with them. Those mediating the process need to be in a position to deal with the breadth and complexity of skills and experiences.
- Prior knowledge and experience will have an impact on how information tasks are tackled and the products produced, including vocabulary, skills, and understanding of task. It is important for mediators to be aware of potential language and skills barriers to understanding, for example vocabulary or subject conventions.
- The information-related activities planned by teachers will determine which skills are important for that occasion but others will inevitably come into play. Mediation may be required to help students overcome challenges encountered both in the priority areas as well as other aspects of the information process.
- Mediators need to be aware that students may approach a task with a particular understanding and information stance (for example: gathering, finding a right answer, seeking a balanced view) that may not be appropriate for that particular outcome.
- Students need help to make connections between skills and process, and good quality work and increased knowledge and understanding.
- Reflection by students is required throughout the process, to examine appropriateness of actions and decisions in relation to purpose and this needs to be explicitly acknowledged and mediated or guided.

***Implementing information literacy***

- The school community need to consider the place of information gathering (finding), information transfer (selecting and communicating) and information transformation (knowledge construction) within the overall learning process, as well as the place of organising information and ethical issues in the information process.
- Teachers need to consider carefully the learning outcomes of information related activities, how they want students to tackle any given task and

ensure that the activity and tasks are presented to students so that there is a shared understanding of what is expected. For example is the focus of the outcome to understand sources, extract information or to build and extend knowledge, to develop creative ideas or understand ethic issues related to information? What are the most suitable questions for that outcome?

- Consideration needs to be given to how monitoring the process and mediation can enhance the information learning experience. For example, checking of records maintained by students during the information process and formative assessment of the skills, knowledge and understanding gained, both for subject content and the information process.
- The school community needs to examine and discuss opportunities and scope to introduce, reinforce and practice skills and mechanisms for tracking skills development both within departments and across discipline boundaries.

The issues highlighted in the bulleted lists are closely associated with concerns expressed by teachers in this study and relate to both to mediation at the class level and implementing information literacy at a strategic level. However, it does not represent an exhaustive list of all aspects of information literacy that might be considered when implementing an information literacy strategy.

Participating teachers began to recognise the complexity of information literacy, how it encompasses a wide variety of inter-related skills and is closely associated with wider aspects of learning. As such it is likely to be a daunting prospect knowing where to start and what can be achieved in developing information literacy in students. While recognising that the school community as a whole needs to understand the complex relationship between information literacy and learning, a few participating teachers showed that by tackling something small, that is of immediate concern to themselves and their students, positive changes can be achieved. Small achievements shared with colleagues can be an effective means of stimulating debate, keeping the momentum going and ensuring continued reflective practice.

Teachers indicated that interaction with colleagues, whether other teachers, senior management or the school librarian, plays an important part in the way they develop professionally, take on board and tackle new initiatives, and make changes in their teaching practice. However, research indicates that true collaborative partnerships are more difficult to establish within the environmental, time and curricular constraints of secondary education. Most teachers viewed the development of information literacy as a collaborative venture across departments within the school and some saw the school librarian as part of that development team. At present shared understanding of the roles the teaching and librarian professions can play to developing information literate students is limited and both parties can learn from each other by opening up the debate about information literacy in their own school communities.

# 6 CONCLUSION

The study set out to examine how secondary teachers conceptualise information literacy. It sought to identify issues relating to its integration into the curriculum and how information literacy is interpreted in learning tasks. As part of the study, it was also of interest to observe whether teachers' conceptions and understanding of information literacy changed after a period of reflection and discussion with colleagues, and how teachers' interpretation compared with those of the information profession.

## 6.1 Review of project as whole

Amongst the wider education community there was a positive response to the project suggesting that the way students handle information is of interest not only in the information world but also in education. Despite the usual difficulties of recruiting teachers for research, the project had sufficient volunteers to meet the sample criteria for group discussions and the reflective phase of the study. Each phase generated a large amount of valuable data for analysis and the study achieved what it set out to do. The project has provided an understanding of how teachers conceptualise information literacy, how this is related to what they do in the classroom and how this compares with the understanding of the information profession. In addition the study shed light on how teachers' own professional learning is related to their current concerns, and illustrated that understanding of any new concept takes time and practice to manifest itself in positive action.

Participants expressed appreciation of the opportunity to discuss their students' use of information with colleagues: in their experience this was a topic which had rarely been the subject of professional debate. For the majority of these teachers, the term information literacy was unfamiliar and not a concept they had given particular attention to before taking part in the study. Individual teachers indicated that, as a result of the project, they were more aware of the problems their students encounter, of their own assumptions and would give greater consideration to information-related activities in future. Two of the schools are known to be developing further the ideas they had initiated. It was generally agreed that the ideal way forward to developing information literate students was to have some form of whole school focus. However they voiced reservations over the effectiveness of cross-curricular developments and policies directed from the top without real commitment and understanding from teachers who have the task of implementing them. They saw this as unrealistic with the abundance of other initiatives under consideration.

## 6.2 Review of the findings

During analysis teachers' conceptions of information literacy were grouped into six categories and these were described in relation to the many issues and problems they encounter when students undertake information-related activities. The context of these issues and problems fell broadly into three key elements: the student, teacher and educational contexts. Categories of conception focused on finding information, selecting relevant text or basic linguistic understanding, application of a wide variety of skills, through to the more complex making meaning from information within the subject discipline, evaluation of sources, and the learning independently. Much of this is reflected in existing information

literacy frameworks. However, all existing frameworks give greater emphasis to the importance of defining the information need, and some also emphasise building and communicating new knowledge and the ethical issues associated with information. Conversely, these frameworks tend place little emphasis on understanding basic verbal and textual information and making connections and meaning of subject specific information, two strong elements in teachers' conceptions. Comparison of existing frameworks with teachers' conceptions reveals a wide variety of interpretations which vary according to context.

During the course of the study, participants revealed their own learning in the way their conceptions remained fluid, and continued to evolve throughout the study. Like any learning situation these teachers came to the study with differing knowledge, experience and priorities and these portrayed themselves in the manner in which they responded to questions and discussions. Not surprisingly, those teachers who engaged in close observation of their students, came to the second group discussion with a greater understanding of students' problems and possible solutions than teachers who engaged in more general reflection.

Teachers recognised the importance of information literacy for lifelong learning and considered it to be integral to what they do as teachers. While they accepted that information literacy is embedded within the curriculum, there was also a sense that for many teachers information literacy was considered as cross-curriculum skills building and separate from their subject, rather than a way of learning and teaching. They were concerned with students' narrow or negative attitudes towards learning and most viewed information literacy development as more of a barrier than an encouragement to more positive learning experiences. While teachers indicated that information literacy would contribute to the quality of learning, very few participants appeared convinced that information literacy could be key to greater achievement within their own subject curriculum. Teachers were concerned that pressures imposed by the current curriculum restricted the extent to which they are able to concentrate on any learning that cannot be justified in terms of exam results and the majority were not convinced that the time spent developing information literacy skills would be reflected in assessment grades. At the same time participants appeared to have little confidence in their ability to develop students' information literacy, particularly without cross-curricular reinforcement. They were uncertain how students developed certain skills, and were not often conscious of direct input themselves.

When describing information-related activities it was apparent that teachers do attempt to tackle some of the issues associated with information. Despite the fact that observation, reflection and mediation appear to be key to quality learning for students, teachers' perception was that they neither have the space nor the time to do this consistently. The issue of directly observing and monitoring students' skills development and mediating the process appeared to be challenging for teachers and acts as a barrier to their own professional learning. However, despite reservations about how much impact individual teachers can make on students' information literacy, this study has identified a number of ways in which research in the field could help teachers tackle some of the challenges which they recognised as directly affecting the quality of student work.

At the micro level strategies could be considered to enhance mediation of the information process for students: information literacy is founded upon standard educational theory which encourages scaffolding, timely and appropriate mediation, discussion and continual reflection. Greater consideration could be given to the learning objectives of information-related activities, particularly project work where the inter-relationship of skills is at its most complex. It is also

important to ensure that students understand and fulfil teacher expectations. Current research in information literacy indicates the importance of taking account of prior knowledge and student understanding when presenting activities, as well as ensuring that the way an activity is presented reflects the type of process and outcome expected. Strategies could be put in place to ensure that students understand how information is organised and presented in various physical and virtual environments, and the importance of developing the practical skills and cognitive abilities to use information effectively.

At the macro level members of the school community can engage in dialogue and work towards shared knowledge of information literacy and shared understanding of common and complementary goals by all those involved in supporting information literacy. This should include understanding of the relationship of information literacy and learning within the curriculum as a whole, the balance between different information outcomes in terms of skills development, knowledge building and generation, and social and ethical issues related to information use.

Information literacy research indicates the importance of inter-professional collaboration and understanding between teachers and librarians but what this actually means in practical terms for the school community has been less clearly defined. For many years school librarians have been frustrated that information literacy has not become embedded within the curriculum. This study identifies factors that might shed light on those frustrations and help pave the way for shared understanding. Teachers agreed that information literacy is important but are not sure themselves how to develop the skills needed to enable their students to become independent users of information. By the end of the study, they recognised how complex information literacy is and that it requires greater understanding and professional development. It was also clear from the findings that attempts by librarians to adhere rigidly to existing definitions and models may not be helpful when engaging teachers in debate about information literacy: existing frameworks differ in emphasis from conceptions identified by teachers. However, once that debate has begun aspects of existing models, frameworks and research might prove helpful when clarifying the approach to be adopted by a school community or when individual teachers tackle specific aspects of information literacy at ground level.

School librarians have a role to play in developing an information literate school by providing resources not only for the students but also professional resources and support for teachers. They are in the unique position of being in a cross-curricular position to co-ordinate information literacy activities, not only those taking place in the library but ensuring consolidation is maintained in the classroom. However, just as teachers need additional understanding and training in information literacy if they are going to be in a position to support information literacy in their students, school librarians need to understand the extent of information-related activity going on in the classroom, and the constraints under which teachers work. Most importantly they need to consider information literacy frameworks and models in a learning rather than library context.

While the study may help stimulate the further debate within schools, it also highlighted some important questions that need further consideration and research by the education and information communities as a whole. For example: What is it exactly that enables some students to engage with information more readily than others? What is the relationship between information literacy development and individual subject disciplines? What else can be learned about the relationship between the different opportunities for handling information and the type of mediation that promotes the development of

independent information users? Perhaps of even more significance is how teachers can be helped to engage in debate about information literacy and learning when they clearly feel swamped by other pressures?

In revealing some of the ways in which teachers think about information and its relationship with learning this study has highlighted not only the complexity of information literacy but also the complexity of the educational environment within which teachers are balancing a number of conflicting pressures. Yet this is the environment which is also encouraging learners to engage with a much wider range of information opportunities and to develop the kinds of critical thinking required to be effective life-long learners. While existing information literacy frameworks and current research in the field can support these developments, teachers need to debate the meaning of information literacy for their own particular community of practice. Evidence from this study would indicate that, in engaging in that debate, however challenging, teachers recognise the importance of information literacy and begin for themselves to explore the potential for developing students' abilities to learn independently.

# REFERENCES


AASL (American Association of School Librarians) and AECT (Association for Educational Communications and Technology) (1998) *Information Power Building Partnerships for Learning*. Chicago: American Library Association.

Abell, A. and Ward, S. (2000) *Skills for knowledge management: building a knowledge economy*. London: TFPL Ltd.

Armstong, C. et al. (2005) Defining information literacy for the UK. *Library + Information update*, 4(1-2), 22-25.

Australian Council of Deans of Education (ACDE) (2001) *New Learning: A Charter for Australian Education.* ACDE: Canberra

Adey, P. and Shayer, M. (1994) *Really raising standards – improving learning through cognitive intervention*. London: Routledge.

Attfield, S., Blandford, A. and Dowell, J. (2003) Information seeking in the context of writing: A design psychology interpretation of the "problematic situation". *Journal of Documentation*, 59(4), 430-453.

Barrett, L. and Danks, M. (2005) *Skills progression: student guide*. Unpublished curriculum framework.

Bates, M.J. (1989) The Design of Browsing and Berrypicking Techniques for the Online Search Interface. *Online Review,* 13(5), 407-424. Online http://www.gseis.ucla.edu/faculty/bates/berrypicking.html [Accessed 23-09-2005]

Becta. *The star model*. Online http://curriculum.becta.org.uk/docserver.php?docid=1912 [Accessed 31-01-05]

Big 6 Associates. (2001-2005) *The Big6 Information Literacy for the Information Age*. Online http://www.big6.com [Accessed 12-04-05]

Brammer, J. (2005, in press) A phenomenographic study of registered nurses' understanding of their role in student learning – An Australian perspective. International Journal of Nursing Studies.

Breivik, P. (1989) *American Library Association Presidential Committee on Information Literacy. Final report*. Chicago: American Library Association. Online http://www.ala.org/acrl/legalis.html [Accessed 21-09-2005]

Bruce, C. (1997) *The Seven Faces of Information Literacy*. Adelaide: Auslib Press.

Bundy, A. (Ed.). (2004) *Australian and New Zealand Information Literacy Framework principles, standards and practice*. 2nd Edition. Adelaide: Australian and New Zealand Institute for Information Literacy. Online http://www.anziil.org/resources/Info%20lit%202nd%20edition.pdf [Accessed 12-04-2005]

Burdick, T.A. (1996) Success and Diversity in Information Seeking: Gender and the Information Search Styles Model. *School Library Media Quarterly*. 24(1), 19-

26.

Burdick, T.A. (1997) Snakes and Snails and Puppy Dog Tails: Girls and Boys Expressing Voice in Information Research Projects. *Youth Services in Libraries.* 11, Fall, 28-36.

Byström, K. (2000) The effects of task complexity on the relationship between information types acquired and information sources used. *The New Review of Information Behaviour Research*, 1, 85-101.

Cheuk, B.W. (2000) Exploring information literacy in the workplace: A process approach. In: Bruce, C. & Candy, P. (Eds.) *Information literacy around the world: Advances in programs and research*. Wagga Wagga, NSW: Charles Sturt University, pp. 177-191.

CILIP (Chartered Institute of Library & Information Professionals) (2004) *Information Literacy: definition*. Online http://www.cilip.org.uk/professionalguidance/informationliteracy/definition/ [Accessed 12-04-2004]

Condie, R., Simpson, M., Payne, F. and Gray, D. (2002) *The Impact of Information and Communication Technology Initiatives in Scottish Schools*. [Edinburgh:] Scottish Executive. Online http://www.scotland.gov.uk/consultations/education/ictimpact.pdf [Accessed 26-06-2003].

DfES (2005) *14-19 Education and Skills White Paper*. London: Department for Education and Skills.

DfES (2004) *Improve your library: a self-evaluation process for secondary school libraries and learning resource centres.* London: Department for Education and Skills.

Donnelly, A. and Craddock, C. (2002) Information literacy at Unilever R&D. *Update*, December, 40-42.

Entwistle, N. & Smith, C. (2002) Personal understanding and target understanding: Mapping influences on the outcomes of learning. *British Journal of Educational Psychology*, 72, 321-342.

Erdelez, S. (1997) Information Encountering: A Conceptual Framework for Accidental Information Discovery. In: Vakkari, P. Savolainen, R. & Dervin, B. (Eds.) *Information Seeking in Context*. Proceedings of an internation conference on research in information needs, seeking and use in different contexts. University of Tampere, Finland, August 1996. London: Taylor Graham, 412-421.

Foresight ICM Panel. (2000) *Point and Click – learners in the ICT driving seat: a consultation document, 2000*. Online http://www.foresight.gov.uk

Franz, J., Ferreira, L., and Thambiratam, D.P. (1997) Using phenomenography to understand student learning in civil engineering. *International Journal of Engineering Education*, 13(1), 21-29.

Harrison, C., Comber, C., Fisher, T., Haw, K., Lewin, C., Lunzer, E., McFarlane, A., Mavers, D., Scrimshaw, P., Somekh, B., Watling, P. (2003) *ImpaCT2 The Impact of Information and Communication Technologies on Pupil Learning and Attainment*. Full Report. [Becta] Online

http://www.becta.org.uk/research/research.cfm?section=1&id=561 [Accessed 22-05-06]

Herring, J.E. (1999) *Exploiting the Internet as an Information Resource in Schools*. London: Library Association Publishing.

HMIE (HM Inspectorate of Education) (2005) *How good is our school? Libraries Supporting Learners*. Livingston: HM Inspectorate of Education.

Kalantzis, M., Cope, B. and Harvey, A. ( 2003 ) Assessing Multiliteracies and the New Basics. *Assessment in Education: principles, policy, and practice* 10 (1): 15-26.

Kuhlthau, C.C. (2004) *Seeking Meaning: a process approach to library and information services*. 2nd edition. Norwood, New Jersey: Ablex Publishing Corp.

Kuhlthau, C.C. (1997) The Influence of Uncertainty on the Information Seeking Behavior of a Securities Analyst. In: Vakkari, P., Savolainen R. and Dervin, B. (Eds.) *Information Seeking in Context*. Proceedings of an internation conference on research in information needs, seeking and use in different contexts. University of Tampere, Finland, August 1996. London: Taylor-Graham, pp. 268-274.

Kuhlthau, C.C. (1993) Implementing a Process Approach to Information Skills: A study identifying indicators of success in library media programs. *School Library Media Quarterly* 22(1), 11-18.

Lance, K.C. (1997) The impact of school library media centers on academic achievement *Scan,* 16(1), 52-53.

Lemke, J.L. (1998) Metamedia Literacy: Transforming meanings and media. In: Reinking, D., Labbo, L., McKenna, M. and Kiefer, R. (Eds.) *Literacy for the 21st Century: Technological Transformation in a Post-typographic World*. Mahwah, NJ: Erlbaum, 283-301. Online http://academic.brooklyn.cuny.edu/education/jlemke/reinking.htm [Accessed 17-08-2005]

Limberg, L. (1999) Experiencing information seeking and learning: a study of the interaction between two phenomena. *Information Research*, 5(1). Online http://informationr.net/ir/5-1/paper68.html

Loertscher, D. (2000) *Taxonomies of the school library media program.* (2nd ed) San Jose, CA: Hi Willow Research and Publishing.

Lupton, M. (2004) *The Learning Connection Information Literacy and the Student Experience.* Blackwood, South Australia: Auslib Press.

Maclellan, E. and Soden, R. (2003) Expertise, expert teaching and experienced teachers' knowledge of learning theory. *Scottish Educational* Review, 35(2), 110-120.

Many, J.E., Fyfe, R., Lewis, G., & Mitchell, E. (1996) Traversing the topical landscape: Exploring students' self-directed reading-writing-research processes. *Reading Research Quarterly,* 31(1), 12-35.

Marland, M. (1981) (Ed.) *Information skills in the secondary curriculum*. (Schools Council Curriculum Bulletin 9). Methuen Educational.

Marton, F. (1981) Phenomenography – Describing conceptions of the world around us. *Instructional Science*, 10, 177-200.

Marton, F. (1988) Phenomenography: Exploring different conceptions of reality. In Fetterman, D.M. (Ed.) *Qualitative Approaches to Evaluation in Education: The silent scientific revolution.* New York: Praeger, 176-205.

Maybee, C. (2006) Undergraduate perceptions of information use: the basis for creating user-centered student information literacy instruction. *The Journal of Academic Librarianship*, 32(1), Jan, 79-85.

McKenzie, J. (2000) The Research Cycle. From Now On: The Educational Technology Journal, 9(4), December 1999. Online http://questioning.org/Q6/research.html [Accessed 27-06-06]

McKenzie, J. (2003) Questioning as Technology. *From Now On: The Educational Technology Journal,* 12(8). Online http://www.fno.org/apr03/qtech.html [Accessed 12-04-2005]

Merchant, L. and Hepworth, M. (2002) Information literacy of teachers and pupils in secondary schools. *Journal of Librarianship and Information Science*, 34(2), 81-89.

Montiel-Overall, P. (2005) A Theoretical Understanding of Teacher and Librarian Collaboration (TLC). *School Libraries Worldwide*, 11(2), 24-48.

Moore, P. (1995) Information Problem Solving: a wider view of library skills. *Contemporary Educational Psychology*, 20, 1-31.

Moore, P. (2000) Primary School Children's Interaction with Library Media. *Teacher Librarian*, 27(3), 7-11.

Moore, P. (2002) *Information Literacy What's it all about?* Wellington: New Zealand Council for Educational Research.

Mutch, A. (1997) Information Literacy: An Exploration. *International Journal of Information Management*, 17(5), 377-386.

Nisbet, J. and Shucksmith, J. (1986) Learning Strategies. London: Routledge & Kegan Paul.

Ofsted. (2001) *Inspecting School Libraries and Learning Resource Centres Update No. 36 Aug 2001. Appendix D*. Online http://www.ofsted.gov.uk/publications/docs/update36-08.htm [Accessed 28-08-2003]

Rogers, R. (1994) *Teaching Information Skills a review of the research and its impact on education*. East Grinstead: Bowker-Saur.

Schroeder, E.E. and Zarinnia, E.A. (2001) *Problem Based Learning: Developing Information Literacy through Real World Problems*. Paper presented at Treasure Mountain 9, a teacher-librarian think tank research retreat, November 2001.

SCONUL (2004) *The Seven Pillars of Information Literacy*. Online http://www.sconul.ac.uk/activities/inf_lit/seven_pillars.html

Scottish Executive (2004) *A Curriculum for Excellence: The Curriculum Review Group.* Edinburgh: Scottish Executive.

Shapiro, J.J. and Hughes, S.K. (1996) Information Literacy as a Liberal Art: Enlightenment proposals for a new curriculum. *Educom Review*, 31(2). Online http://www.educause.edu/LibraryDetailPage/666?ID=ERM96210 [Accessed 04-10-2005]

Sherin, M.G. and Shulman, L.S. (Eds.) (2004) Disciplinary Perspectives on Fostering Communities of Teachers as Learners: A Special Issue. *Journal of Curriculum Studies*, 36(2), March-April.

Small, R. (1998a) Designing Motivation into Library and Information Skills Instruction. *School Library Media Research (SLMR)*, 2.

Small, R.V. (1998b) Motivational aspects of library and information skills instruction: The role of the library media specialist. In: Callison, D., McGregor, J. and Small, R.V. (Eds.) *Instructional interventions for information use*. San Jose, Calif.: Hi Willow Research and Publishing.

Smith, M. & Hepworth, M. (2005) Motivating learners to become information-literate. *Library + Information update*, 4(1-2), January/February 2005, 46-47.

Thomson, S. (2003) *Information Literacy Meeting of Experts*. A report on a conference sponsored by US National Commission on Library and Information Science and the National Forum on Information Literacy, with the support of UNESCO. Prague, 20-23 September, 2003, 3. Online http://www.nclis.gov/libinter/infolitconf&meet/post-infolitconf&meet/FinalReportPrague.pdf [Accessed 30-05-06]

Todd, R.J. (1997) Information Utilisation: A Cognitive Analysis of how Girls Utilise Drug Information Based on Brookes' Fundamental Equation (K(S) + ΔI = K(S+ΔS). In: Vakkari, P., Savolainen R. and Dervin, B. (eds.) *Information Seeking in Context*. Proceedings of an internation conference on research in information needs, seeking and use in different contexts. University of Tampere, Finland, August 1996. London: Taylor-Graham, 351-370.

Todd, R.J. (1999) Utilization of Heroin Information by Adolescent Girls in Australia: A Cognitive Analysis. Journal of the American Society for Information Science, 50(1), 10-23.

Todd, R.J., Kuhlthau, C.C. and OELMA. (2004) *The Ohio School Library as a Dynamic Agent of Learning: Essential learning foundations.* Online http://www.oelma.org/studentlearning/default.asp [Accessed 20-06-06]

Vygotsky, L. (1978) *Mind in Society: The Development of Higher Psychological Processes.* Cambridge: Harvard University Press.

Wavell, C. (2004) *School librarians' understanding and descriptions of student learning in the school library*. Unpublished MSc dissertation. Aberdeen: The Robert Gordon University.

Webb, N.L. and Doll, C.A. (1999) Contributions of Library Power to Collaborations Between Librarians and Teachers. *School Libraries Worldwide,* 5(2), July, 29-42.

Webber, S. & Johnston, B. (2005) Information literacy in the curriculum: selected findings from a phenomenographic study of UK conceptions of, and pedagogy for,

information literacy. In: Rust, C. (Ed.) *Improving Student Learning: Diversity and Inclusively*, 212-224. The proceedings of 12th Improving Student Learning symposium, Birmingham, 2004.

Williams, D. and Coles, L. (2003) *The Use of Research Information by Teachers: information literacy, access and attitudes.* A report for the Economic and Social Research Council (ESRC ref R000223842). Aberdeen: Robert Gordon University.

Williams, D., McConnell, M. and Wilson, K. (1997) *Is there any knowledge out there? The impact of research information on practitioners.* Boston Spa: British Library. British Library Research and Innovation Report RIC/G/321.

Williams, D.A. and Wavell, C. (2001) *Impact of the School Library Resource Centre on Learning.* Final report on a research project funded by Resource: The Council for Museums, Archives and Libraries. Library and Information Commission Research Report 112. (The Robert Gordon University School of Information and Media Research Report 9). Aberdeen: The Robert Gordon University.

WILSON, V. (2000) *Educational Forum on Teaching Thinking Skills.* Edinburgh: Scottish Executive Education Department.

Zweizig, D.L. and Hopkins, D.M. (1999) *Lessons from Library Power. Enriching Teaching and Learning*. An Initiative of the DeWitt Wallace-Reader's Digest Fund. Englewood, Colorado: Libraries Unlimited, Inc.

# APPENDICES

**Appendix A:** Participation Agreement

**Appendix B:** Information Related Activities Grid

**Appendix C:** Suggestions for an Observation Log

**Appendix D:** Summary of Information Literacy given to participants

**Appendix E:** Examples of Information Skills

**Appendix F:** Example of a Reflection logs

**Appendix G:** Examples of Information-related Activities

**Appendix H:** Comparison of UK curriculum stages in school education

**Appendix I:** Comparison of Information Literacy Frameworks

**Appendix J:** Summary of Dissemination Event

# Appendix A: Participation Agreement

SECONDARY SCHOOL TEACHERS' CONCEPTIONS OF INFORMATION LITERACY IN RELATION TO THEIR CLASSROOM PRACTICE

A study funded by the SOCIETY FOR EDUCATIONAL STUDIES,
conducted by researchers at the Robert Gordon University, August 2004 – July 2005

☐ **I understand what participation in the project involves.**

☐ **I understand that the research team will record (both on audio tape and in note form) group and/or individual discussions, as appropriate.**

☐ **I understand that I will remain anonymous in all forms of research dissemination and that any data I provide for the purpose of this research will be held in accordance with the Data Protection Act 1998 and will only be used for the purpose of this research.**

☐ **I have volunteered to take part in the study and understand that I am able to withdraw at any time by contacting a member of the research team.**

***Please print name and school contact details (including subject discipline and email address)***

**Signature** **Date**

# Appendix B: Information Related Activities Grid

# Secondary School Teachers' Conceptions of Information Literacy in Relation to their Classroom Practice

**Please complete the grid with a few examples of information-related curriculum activities undertaken by your students.**

| Description of curriculum unit/ activity: subject, theme, level. (e.g. Standard Grade Art: Influences of Diaghilev's Ballets Russes) | What are the expected outputs/outcomes of the activity? | Where information comes from? (e.g. internet, reference books, textbook, teacher) | Skills, knowledge and understanding involved in finding & using information. |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

# Appendix C: Suggestions for a Reflective Observation Log

OBSERVATION & REFLECTION LOG

A number of individuals have kindly agreed to contribute further to this project by looking in-depth at pupil use of information as part of their curriculum activities. However, we would like you all to learn from this experience and encourage each of you to take a close look at information handling in the classroom.

Please record your thoughts, ideas, observations, and strategies at regular intervals (perhaps weekly or fortnightly) over the course of the Spring Term, and email or post copies to me.

I suggest you do this in stages:

1. First, select an information-related curriculum activity and use headings from the grid to provide background information on the activity observed:

   - Description of curriculum unit/activity: subject, theme, level. (e.g. Standard Grade Art: Influences of Diaghilev's Ballets Russes);
   - What are the expected outputs/outcomes of the activity? (e.g. report, critical essay, leaflet, talk, increased knowledge, understanding concept, practice technique);
   - Where does the information come from? (e.g. internet, reference books, textbooks, teacher);
   - Skills, knowledge and understanding involved in finding & using information.

   *(A copy of the Information Literacy Activity Grid, which you completed at the start of the first group discussion, can be found in the Activities for Participants Folder on the Discussion Group.)*

2. Initially, it is important to establish what is actually happening. Use the key questions from the group discussion to focus your observation and reflection of pupil information handling, considering their successes and problems.

   - How does information literacy impact learning?
   - What strategies have been adopted?
   - How well does it work?
     - What sort of things do learners cope with well?
     - What problems do learners experience/encounter during these activities?
     - How could the learning experience be improved?

3. Then consider aspects you feel could be improved and alternative strategies you might try to enhance the learning experience.

   The online discussion group is intended as a means of facilitating the process of collaborative learning and we hope you will use the Discussion Group on the Virtual Campus as a tool to share your experiences so we can learn from each other. I will post summaries of the group discussions and will also post various documents and links you might find useful to consider when undertaking your individual reflection. Please feel free to use these (or not) as you think appropriate and post comments either to the group as a whole or to individuals but please include me in any communication.

I plan to visit each school to discuss your observations. In the meantime, I look forward to hearing from you by email, by phone, by post, or through the discussion group.

Caroline Wavell
c.wavell@rgu.ac.uk
01224 263886

# Appendix D: Summary of Information Literacy given to participants

**Information Literacy:**
**a brief commentary**

## 1. Information Literacy Definitions

There have been numerous definitions of information literacy. The latest definitions stress the searching, use and ethical issues, for example:

> "Information literacy is knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner.
>
> This definition implies several skills. We believe that the skills (or competencies) that are required to be information literate require an understanding of:
>
> - a need for information
> - the resources available
> - how to find information
> - the need to evaluate results
> - how to work with or exploit results
> - ethics and responsibility of use
> - how to communicate or share your findings
> - how to manage your findings."[1]

Perhaps missing from this definition is indication of *effective* use or communication.

## 2. Information Literacy Frameworks

The skills or competencies required to be information literate have been developed by a number of bodies into frameworks or standards. These may be useful as a checklist for competencies that students should be developing and that could/should be considered, incorporated, reinforced when developing an information literacy strategy.

A useful framework is the Australian and New Zealand Information Literacy Framework intended for Higher Education[2].

The USA has an Information Literacy Framework designed for schools[3]. This includes the notion of competency levels but care needs to be taken not to develop a tickbox approach, as students may experience differing mediation needs and competency levels when faced with different and particularly unfamiliar information tasks.

Bruce's describes seven experiences with information literacy which takes account of different uses of information: awareness, retrieval, solution to problem, future retrieval, knowledge building, new ideas, wise use. All these experiences are considered equally valid depending upon the intended use. This might also

---

[1] Chartered Institute of Library & Information Professionals. (2004*) Information Literacy: definition*. Online http://www.cilip.org.uk/professionalguidance/informationliteracy/definition/ Accessed 12-04-04

[2] Bundy, A. (ed.). (2004) *Australian and New Zealand Information Literacy Framework principles, standards and practice*. 2nd Edition. Adelaide: Australian and New Zealand Institute for Information Literacy. Online http://www.anziil.org/resources/Info%20lit%202nd%20edition.pdf Accessed 12-04-05

[3] AASL and AECT (1998) Information Power Building Partnerships for Learning. Chicago: American Library Association.

provide a useful framework when incorporating information literacy into the curriculum.[4]

## 3. Information Literacy Models

Information literacy models tend to be used as learning and teaching aids, and examples are used in some school libraries and have been encouraged through curriculum materials.

Models (Marland, Big6) have been around a long time[5]. Do they work?
Becta has a recent Star Model which is closely associated with ICT in the Curriculum[6].
The Star model and one developed by Moore[7] emphasise the cyclical and iterative nature of the information process and the importance of establishing prior knowledge. Moore's model places continual reflection at the centre of the research process, the Star Model places active teaching at the centre, both important elements.

## 4. Significant research

Recent research into the information process has highlighted a number of issues:

- Task setting – fact finding versus problem solving or decision making[8]
- Questions – often set in research projects too early, need for broader understanding first[9]
- Prior knowledge – (including vocabulary) plays significant part in how research is conducted or information is sought and used[10]
- Affective elements – frustrations, optimism experience by even experienced users[11]
- Timely and appropriate mediation/intervention[12]

## 5. Solutions to problems

---

[4] Bruce, C. (1997) *The Seven Faces of Information Literacy*. Adelaide: Auslib Press, p.113
[5] Big6 Associates. (2001-2005) *The Big6 Information Literacy for the Information Age*. Online http://www.big6.com Accessed 12-04-05
Marland, Michael (ed), Information skills in the secondary curriculum, (Schools Council Curriculum Bulletin 9), Methuen Educational, 1981
[6] Becta. The star model. Online http://curriculum.becta.org.uk/docserver.php?docid=1912 Accessed 31-01-05.
[7] Moore, P. (2002*) Information Literacy What's it all about?* Wellington: New Zealand Council for Educational Research, p.36.
[8] Schroeder, E.E. and Zarinnia, E.A. *Problem Based Learning: Developing Information Literacy Through Solving Real World Problems*. Treasure Mt. Online, 2000.
[9] McKenzie, J. From Now On. Online http://www.fno.org/ Accessed 12-04-05
Wavell, C. *School librarians' understanding and descriptions of student learning in the school library.* Unpublished MSc dissertation, The Robert Gordon University, 2004. Online http://www.rgu.ac.uk/abs/research/page.cfm?pge=13089 Accessed 19-10-04
[10] Limberg, L. (1999) Experiencing information seeking and learning: a study of the interaction between two phenomena. *Information Research*, 5(1) Online http://informationr.net/ir/5-1/paper68.html Accessed 28-01-02003
Todd, R. Back to our beginnings: information utilization, Bertram Brookes and the fundamental equation of information science. *Information Processing & Management*, 35, pp.851-870
Smith, M. and Hepworth, M. (2005) Motivating learners to become information-literate. *Library & Information update*, 4(1-2),46-47.
[11] Kuhlthau, C.C. *Seeking Meaning A Process Approach to Library and Information Services*. 2nd edition. Westport, Connecticut: Libraries Unlimited, 2004.
[12] Kuhlthau, C.C. *Seeking Meaning A Process Approach to Library and Information Services*. 2nd edition. Westport, Connecticut: Libraries Unlimited, 2004.
Smith, M. and Hepworth, M. (2005) Motivating learners to become information-literate. *Library & Information update*, 4(1-2),46-47.

Many of issues identified during group discussions reflect a lack of information literacy competencies in students.

Do the solutions lie in the study and implementation of information literacy research:

- Understanding of your own information seeking behaviour (both teacher and student),
- Understanding the concept of information literacy and research behind it,
- Use of frameworks, models, etc.

and/or

Study and implementation of learning and teaching theory, such as:

- Collaborative learning (learning as a conversation),
- Formative assessment/feedback (timely and appropriate mediation/intervention by knowledgeable other),
- Reorganising curriculum (enabling opportunities for practice and consolidation)?

# Appendix E: Examples of Information Skills

The skills involved in using information were not always defined explicitly but a wide variety became apparent through discussion and in the completed grids. The end column on the grid was completed as skills, knowledge and understanding that students would require and develop. These have been extracted as a list of skills that are thought to be required when interacting with information.[1]

The following are more general learning skills:

- Ability to listen, think, understand, follow instructions, be specific, work independently, work as group, discuss, understanding subject knowledge, communicate, take responsibility, write coherently;

The list below represents more specific information literacy skills:

1. questioning skills (for interviews);
2. ability to select appropriate resources (types of books, websites)
3. ability to use appropriate resources (e.g. index, contents, search engines, web site navigation, encyclopaedias, keyword formulation), also data sources (e.g. maps, diagrams, statistics) and visual sources (video, photos, pictures);
4. understanding structural/organisational elements of information systems (ICT, libraries );
5. ability to record (e.g. note making, bullets, mind maps, copy & paste) information (key points, ideas) from source;
6. ability to monitor understanding, read text with understanding, to use skim, scan, highlighting techniques, using contextual clues;
7. ability to select appropriate information for task in hand;
8. rejecting information;
9. connect with information already known, including appropriate terminology;
10. ability to organise information for task, including condensing, summarising, paraphrasing, synthesising; comparing, contrasting, integrating information from variety of sources, draw conclusions, as well as organising for revision;
11. ability to present and share knowledge and understanding gained during process to others, in creative way when appropriate;
12. understanding of audience, user needs;
13. recognition of need and ability to acknowledge sources;
14. understanding requirements of task (breaking task into subtasks), including computing subject-specific context of analysing elements within task, translating tasks into processes and processes into decisions
15. ability to critically evaluate results of information related task (subject-specific where necessary)
16. appreciate and distinguish bias and achieve balanced understanding of concept/idea, justify an opinion with information (evidence);
17. identify facts, give examples;
18. discriminate (evaluate) reliability of sources
19. develop own opinions, make decisions, gain new knowledge;
20. develop awareness of information/sources/resources, including local selections of information (intranet);
21. develop use of software applications to present information;
22. understand chronology, causation, make links between factors

[1] This list does not as yet include all those identified from the group discussions.

This very detailed (and non-hierarchical) list is the accumulated results of first discussion group grids and reflection logs feedback. It is unlikely that any one individual would identify all or see all the connections between the various skills used in different contexts. Some were expressed by individuals in general terms, some from a subject-specific focus (for example numbers 4, 11, 22).

# Appendix F: Example of a Reflective Observation Log

Several participants undertook more detailed examination of information-related activities in the classroom.

Set out below is a condensed version of one participant's observation notes. During discussion with the researcher, this teacher indicated that she shifted her efforts to developing skills for extracting information with these students because she felt there is no point in finding information without being able to use it.

| | |
|---|---|
| *"Class:* | *Third Year, Standard Grade Science* |
| *Ability:* | *Most below average for year group* |
| *Topic:* | *'Materials'* |
| *Learning outcomes:* | *To identify man-made and natural materials from a list of commonly used materials (e.g. wood, metal, plastic, glass, leather, nylon, polyester, wool)* |
| *Learning task:* | *Find out, using books and internet, whether materials (in a list provided) are man-made or natural. Make a brief note on where they come from or how they are made. Present the information as a poster.* |

*<u>Lesson 1 – in the school library, using books only.</u>*
*The librarian had picked out a selection of books related to 'materials', most containing information relevant to the task. She also showed pupils where the encyclopaedias were.*

*<u>Observations and thoughts:</u>*

- *Most pupils needed myself, the librarian or the learning assistant to get them started on the task. Most required the task to be explained to them individually.*
- *All chose a book, but most chose fairly randomly without considering its usefulness for the task.*
- *Pupils tended to decide which material they wanted to find out about, but may have chosen a book which did not contain information on that material. Instead of checking whether it contained information on another of the materials from the list, they tended to swap it for another book.*
- *Many pupils were unable or unwilling to search for information in the book and asked for help or waited/time-wasted until prompted to look. They then said they didn't know what to do.*
- *Many needed to be prompted to look at the contents page and/or index and none understood the difference between these...*
- *One pupil, who did not have a useful book, was encouraged by the librarian to use a childrens' encyclopaedia. When I reached the pupil, she was hunting for the index in one volume. I explained that it didn't have an index. The pupil was looking for information on glass in a volume which did not contain 'g' words. I explained how to use the alphabetical system in the encyclopaedia. The pupil then struggled to find the information as she was not familiar enough with the alphabet to choose the appropriate volume quickly, especially choosing between volumes such as frog-grape and grape-house for 'glass'. Several other pupils experienced the same problem.*
- *Nearly all pupils lacked confidence/skills/motivation to find the information they were looking for from a page of text, even when I*

*had found an appropriate page for them. They appeared daunted and de-motivated by the large amount of text which they were unwilling to spend time/effort reading. Most did not seem to know how to skim-read (or did not have the reading fluency to do this), so their reluctance was understandable, especially if they were unsure whether the text even contained the information they needed.....*

*Each week, I put one of our 4 lessons aside to develop the problem-solving skills required for Standard Grade Science, including things like graph drawing, making tables, calculating percentages etc. Following our library/internet session, I decided to use one of these lessons to help the pupils develop the skills needed to find information they are looking for from a page of text. These skills are immediately applicable in a certain type of exam question (which is likely to appear in some form in their final exam) in which pupils are given a passage of information (relating to one of the topics covered) and are asked questions which can be answered from the text (a 'reading comprehension' on a Science topic, I guess). However, I think the skills are probably important throughout the exam - exam questions are often very wordy, with a lot of information. A pupil needs to be able to pick out the important information, preferably quickly...So I think it is probably very important that we help pupils develop the skills and confidence to 'cope' with blocks of text, without being daunted. (I have noticed in a recent test that quite a few pupils seem to ignore blocks of text altogether and just try to answer the questions which follow it, which is often an impossible task when the answer or vital information is in the text!)*

*So... I chose a wordy page in a text book on 'materials', (their uses, properties and how they are made). Each pupil had a copy of the text book.*

*As a whole class:*
*I asked pupils to race to find a particular word on the page and asked the 'winner' how they did it. They told us that they 'skim read'. We briefly discussed what that meant, talked about taking a good look at the word then scanning the page for that 'shape', or 'pattern', rather than reading every word on the page. (I have no idea if this is the 'official' line - I simply tried to reflect on what I do when I skim read and asked them what they do).*

*I then asked them to count the number of times the word 'properties' appeared. We then discussed which occurrences were hardest to spot - they suggested paragraph headings and picture captions, since you tend to scan the main text.*

*I then asked them to find the sentence that began 'China is made from ...' and again asked the pupils how they did it. We identified 'china' as the most useful word in the sentence to search for - a keyword...*

*Finally, I asked them to find a sentence ABOUT 'examples of raw materials'. The pupil who found it first said that he searched for the words 'raw materials'. However, I also drew their attention to the fact that they could not find that information unless they knew what was meant by 'examples of...', so highlighting that we need to understand*

*both the question and the text, as well as spotting keywords, to do this more complex task. (NB the word 'examples' was not in the text).*

*Most pupils participated in this task, but were a bit chatty and unsettled (nothing unusual for this class in the lesson after lunch!). I felt it was worth doing this 'introductory' session as a whole class, despite the challenge of managing behaviour/maintaining attention, before setting them an individual task. I think it was important to articulate the processes that we use to do these tasks - I don't know how much of what we discussed was new to them, but they seemed to listen/take in the points we were discussing without moaning about it being too hard or 'we've done this in English Miss', so I suspect it had an element of novelty.*

*Individual task:*
*I put up an OHT containing 2 or 3 examples of each of the tasks we had practised (described above). The only addition was a final question in which pupils were asked actual questions for which the answers could be found from the passage (e.g. what are 3 properties of plastic?), since this is the sort of thing they would be asked in the exam. Pupils worked through at their own pace.*

*Pupils were very well focused on this task and most managed to finish or nearly finish. They seemed to find it achievable (only one complaint about finding it too difficult, which some help and reassurance soon sorted) yet they had to put some real effort in to manage it, particularly the later, more difficult bits e.g. finding a sentence ABOUT something. They seemed pleased with their efforts - the level of engagement and satisfaction was about the best I've achieved with them in a genuinely 'educational' task, especially one which did require, in its later stages, some 'thinking' (something they usually shy away from!).*

*Note... I noticed that one dyslexic pupil, when counting the number of times the word 'plastic' appeared, looked up at the board to read the word again after EVERY 'spotting' of it. I imagine this is due to the short term visual memory difficulties associated with dyslexia.*

*Overall, this lesson seemed to work very well. I'm sure it won't have worked miracles, but I hope it may have helped at least a few pupils develop some strategies for finding information from text."*

# Appendix G: Examples of Information-related Activities

A very brief selection of activities are given below to illustrate the range of information-related activities undertaken.[1]

Examination of activities could provide the starting point for an information audit, to consider where consolidation might be possible to ensure progression and extension of skills development.

**Geography**
*Description of curriculum unit/ activity:*
S2 Geography "Shaping the Earth" investigation – booklet project
*What are the expected outputs/outcomes of the activity?*
Produce as A5 booklet after researching topic
*Where information comes from?*
Reference books, internet, photocopied sheets, library
*Skills, knowledge and understanding involved in finding & using information.*
Gathering & selecting information processing and presenting information, use of data source

**Geography**
*Description of curriculum unit/ activity:*
S1 Rainforest investigation
*What are the expected outputs/outcomes of the activity?*
A leaflet suitable for primary school pupils with 'key' information – weather, vegetation, people, landscape, wildlife
*Where information comes from?*
Textbook, Teacher, Parents/guardian/relations, Internet (one visit to computer suite)
*Skills, knowledge and understanding involved in finding & using information.*
To find 'key' facts
To be specific
To summarise large amounts of information
To find information suitable for their audience (primary pupils)

**History**
*Description of curriculum unit/ activity:*
Causes of WWII
*What are the expected outputs/outcomes of the activity?*
Produce a mind-map showing a number of factors leading to the outbreak of WWII
*Where information comes from?*
Textbooks (sources), Teacher
*Skills, knowledge and understanding involved in finding & using information.*
Ability to put information into a different format more useful for revision
Causation
The ability to make links between factors

**History**
*Description of curriculum unit/ activity:*
History – SG – Changing life in Scotland – changes in mining 1830-1930

[1] These have been taken from the initial grids and reflection logs, although more details were also given to some during the discussions.

*What are the expected outputs/outcomes of the activity?*
Pass mark at General/ Credit
*Where information comes from?*
Textbook, teacher, work booklet, internet
*Skills, knowledge and understanding involved in finding & using information.*
Reading for understanding
Selection of relevant information
Ability to write coherent answers

**ICT**
*Description of curriculum unit/ activity:*
NC level 5/6, School Lottery Bid, Questionnaire design
Learn to construct a questionnaire containing both open and closed questions for dissemination both in hard copy and electronically.
*What are the expected outputs/outcomes of the activity?*
Design skills incorporating instructions, use of space, testing language.
For electronic version, use of text boxes and check box controls
*Where information comes from?*
Electronic presentation using visualiser, Worksheet, Teacher (differentiated support)
*Skills, knowledge and understanding involved in finding & using information.*
Extension of use of Word/Publisher design tools
Developing awareness of users needs

**ICT**
*Description of curriculum unit/ activity:*
Standard Grade Computing - Communications and Networks - Internet Service Providers
*What are the expected outputs/outcomes of the activity?*
A report suggesting a suitable internet package for 2 fictional characters.
Increased knowledge of the services provided by ISPs, the different kinds of connections and various packages available.
Develop ability to navigate and extract info from commercial web sites
*Where information comes from?*
Web sites of various ISPs (found by pupils either from prior knowledge or internet search)
For extension work: A web site of ISP reviews (supplied by teacher)
*Skills, knowledge and understanding involved in finding & using information.*
Basic web search.
Navigation of large web sites to find relevant information
Identifying and extracting the relevant data.
Comparing the offers made by different web sites
Selecting the 'best' alternative and justifying this decision.

**Business Management / ICT**
*Description of curriculum unit/ activity: subject, theme, level.*
5-14 ICT Core Skill
Search 2 items of information on the internet
*What are the expected outputs/outcomes of the activity?*
Search for appropriate information on topics such as 'recent earthquakes' 'Beethoven Music'.
Select appropriate information
Copy & paste relevant information and graphics into [word] WD

document as a report
*Where information comes from?*
Internet
*Skills, knowledge and understanding involved in finding & using information*.
~~Analysing~~
Following instructions
Searching for appropriate information using search criteria and keywords
Selecting appropriate information and graphics and copying and pasting into WD report

**Science - physics**
*Description of curriculum unit/ activity:*
S3 Physics – energy project
*What are the expected outputs/outcomes of the activity?*
Hand in project, completed over several weeks (typed or hand-written, structured with contents, introduction, etc.) On sources of electrical energy, fossil fuels, etc.
Lower abilities are given 'fill-in-gaps' booklet, with bigger gaps in later sections
*Where information comes from?*
Reference books, Text books, Computer
*Skills, knowledge and understanding involved in finding & using information.*
Internet search /book index
Reading material
Understanding main ideas
Noting any ideas/info
Writing in own words – summary
Structuring info
Lower abilities – structuring not required, very little summarising skills required.

**Science**
*Description of curriculum unit/ activity:*
Passive smoking debate (Year 8)
*What are the expected outputs/outcomes of the activity?*
To investigate the arguments for & against banning smoking in public places, and share these findings with the rest of the class.
*Where information comes from?*
Internet, text books
*Skills, knowledge and understanding involved in finding & using information.*
Learning to use information to justify a particular opinion.

**English**
*Description of curriculum unit/ activity:*
Standard Grade information writing, e.g. famous person, hobby, country
*What are the expected outputs/outcomes of the activity?*
W1 writing piece (information) for S.Grade folio
Individual talk on topic
*Where information comes from?*
Non-fiction (library) books, Own knowledge, Books, magazines, T.V. programmes used by pupils outside school, Internet
*Skills, knowledge and understanding involved in finding & using*

*information.*
Reading and understanding text
Selection of appropriate books
Selection of information
Internet search and use of relevant sites – again selection of appropriate information is an issue
Skimming and scanning
Thinking skills!

**English**
*Description of curriculum unit/ activity:*
Higher English Newspaper Report: The analysis and evaluation of selected newspaper articles
Also used – in a modified way – in Standard Grade: G/C Level
*What are the expected outputs/outcomes of the activity?*
Students will gain a greater understanding of the logical structure and purposes of writing.
They will become more aware of the style of writing – the writers use of word choice, imagery and sentence structure – to create effect.
The students will be more aware of tone and of the ways that they, as readers, may be manipulated.
The students' critical faculties will be honed more finely.
The skills gained here will improve the students' own writing and interpretation skills.
*Where information comes from?*
Newspaper/Magazine articles (current) from the quality press, selected by the teacher or from the students' own reading.
*Skills, knowledge and understanding involved in finding & using information.*
A raised awareness of the way that information is presented.
A raised awareness of the ways that language can be used effectively to present a viewpoint and to persuade.
A more critical understanding of information and a raised awareness of the ways that the writer might attempt to manipulate the reader.
The wider perspective of the world provided in this study will point the students outwards to a wider appreciation of the world and what is happening there.

These activities include process and subject content but descriptions of outputs/outcomes do not always reflect this nor is there clear indication of how some of the skills, knowledge and understanding outlined in the final column are systematically monitored for progression.

# Appendix H: Comparison of Curriculum Stages in School Education

# Comparison of Curriculum Stages in School Education in UK, USA and Australia

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **School Year when Child Reaches Age:** | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| **England & Wales: Year Group** | R Reception year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | < Key Stage 1 > | | | < KS2 > | | | | < KS3 > | | | < KS4 > | | < Post 16* > | |
| ***6th Form remains in common use despite changes** | | | | | | | | | | | | | | |
| **Scotland** | P1 | P2 | P3 | P4 | P5 | P6 | P7 | S1 | S2 | S3 | S4 | S5 | S6 | |
| | 5-14 Curriculum | | | | | | | | | Standard Grade | | Highers & Higher Still | | |
| **The Scottish degree system of four years commences at age 18** | | | | | | | | | | | | | | |
| **N. Ireland Year Group** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **Rep. of Ireland** | Junior Infants | Senior Infants | 1st Class | 2nd | 3rd | 4th | 5th | 6th | 1st Year | 2nd | 3rd | (4th) | 5th | 6th |
| | | | | | | | | | | | | | | |
| **USA: grade** | K | 1 Elementary year | 2 | 3 test | 4 | 5 | 6 test | 7 Junior High | 8 | 9th test | 10 Senior High | 11 | 12th test | |
| | | Elementary | | | Middle | | | | | High | | | | |
| | | | | | | | | | | | | | | |
| **Australia** | K | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | | Primary | | | Junior | | | Intermediate | | | | Senior | | |

# Appendix I: Comparison of Information Literacy Frameworks

# Comparison of Information Literacy Frameworks

| **Teachers' Conceptions** | | **Information Power** (AASL & AECT, 1998) | **CILIP** (2004) | **Seven Faces of Information Literacy** (Bruce, 1997) | | **Kuhlthau** (2004) |
|---|---|---|---|---|---|---|
| Skills – strategies to use when handling information | Understand verbal & textual passages | | | 3 *Information process* - Knowledge gap & process leads to action, solution | | |
| | | 1 Information literate student accesses information efficiently and effectively – incorporating need, question generation, sources & strategies | Understanding the need for information | | | Initiation (feeling of uncertainty) |
| | Find information | | Understanding resources available | | 1 *Information technology* - leads to information awareness | |
| | | | Understanding how to find information | | 2 *Information sources* - Knowing what & knowing sources leads to successful retrieval | |
| | Critical thinking to evaluate sources | 2 Info Lit student evaluates info. critically & competently – relevance, accuracy, fact & opinion | Understanding the need to evaluate results | | | Selection (optimism) |
| | | | | | | Exploration (confusion, frustration) |
| | Making meaning in subject context | | | | 5K*nowledge/construction* - Information Seeking & Critical analysis leads to Personal Knowledge Base (KB) | Formulation of focus (clarity) |
| | Independent research – confident application of strategies | 3 Info Lit student uses info. accurately & creatively – organises, integrates, critical thinking, communicates | | | | Collection (confidence) |
| | | | Understanding how to manage findings | | 4 *Information control* - Information Recognition & control leads to future retrieval | |
| | | | Understanding how to communicate findings | | | Presentation (relief, satisfaction or not) |
| | | 4 Independent student is Info Lit & pursues info. for personal interest | | | | |
| | | 6 Independent student is Info Lit & strives for excellence in info. seeking & knowledge generation | | | 6 *Knowledge extension* - Enhanced KB & insight leads to new ideas | Evaluation of process & product |
| | | 5 Independent student is Info Lit & appreciates literature & creative expressions of info. | | | | |
| | | 7 Student contributes positively to learning community & society is info lit. & recognises importance of info for democratic society | | | 7 *Wisdom* - Enhanced KB & values Leads to wise use | |
| | | 8 Student contributes positively to learning community & society is info lit. & practices ethical behaviour when using info & technology | Understanding ethical & responsible use | | | |
| | | 9 Student contributes positively to learning community & society is info lit. & participates in grps to pursue & generate info | | | | |

# Appendix J: Summary of Dissemination Event

# Summary of Dissemination Event held at The Robert Gordon University, on 07-12-05

**Programme for the day**

A dissemination workshop was held in December 2005. All participating teachers were invited and announcements were posted to neighbouring local education authorities, schools and education alert services.

A great deal of interest was shown in the event, although actual attendance was disappointing with only 19 delegates. Delegates represented the teaching and library professions in secondary, further and higher education. Four participant teachers, representing two schools, attended.

The programme began with a general presentation on information literacy entitled 'Moving beyond the models' by Professor Dorothy Williams. This was followed by a group activity focusing on a description of the information literate learner. A number of resources were available for delegates to browse and consider as the approached this task. Although the description was an important part of this exercise, another dimension was added when groups were asked to reflect on how they had approached the task, what strategies they had used and what worked for them, could they have been more effective and did the reflection process affect the description of the information literate learner. The aim of this additional task was for the groups to consider how they set about a group information task, thus experiencing to some extent the challenges faced by their students.

The afternoon session began with a summary of the findings from the research project, entitled 'Information literacy and learning & teaching' presented by Caroline Wavell. The group activity then focused on priorities and issues, challenging the groups to consider a number of statements which represented issues teachers identified relating to information literacy and student learning. The groups were asked to decide which issues were most important to resolve in order to develop information literacy within a fictional department.

**Outcomes of the day**

Discussion generated during the group activities indicated that each of the educational sector represented at the workshop recognised similar issues and challenges in relation to information literacy and student learning.

Activity 1 highlighted how working in a group required an initial stage of bonding. However, this placed them in a position to brainstorm ideas and share expertise to tackle the task. The groups did not have time to use the book resources provided but identified the presentation and activity sheet as significant sources. They identified prior knowledge and understanding of the task as important aspects for making progress and group dynamics influenced the direction in which the task proceeded. This task was successful in helping those with less experience of information literacy gain greater understanding of different aspects that might contribute to an information literate learner.

Discussion following Activity 2 suggested that the most important issues that needed to be addressed were those focused on challenging and changing attitudes and aspects of the curriculum at management level while the student focused issues were of lower priority.

Feedback from delegates suggested that the day had been useful in consolidating understanding and knowledge and the teachers attending were particularly inspired to report back to colleagues and initiate small changes in their practice to incorporate some aspect of information literacy development.