



## Reference Services Review

An information literacy integration model and its application in higher education

Li Wang

### Article information:

To cite this document:

Li Wang, (2011), "An information literacy integration model and its application in higher education", Reference Services Review, Vol. 39 Iss 4 pp. 703 - 720

Permanent link to this document:

<http://dx.doi.org/10.1108/00907321111186703>

Downloaded on: 02 March 2016, At: 21:01 (PT)

References: this document contains references to 36 other documents.

To copy this document: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)

The fulltext of this document has been downloaded 2247 times since 2011\*

### Users who downloaded this article also downloaded:

Erin L. Davis, Kacy Lundstrom, Pamela N. Martin, (2011), "Librarian perceptions and information literacy instruction models", Reference Services Review, Vol. 39 Iss 4 pp. 686-702 <http://dx.doi.org/10.1108/00907321111186695>

Robert Detmering, Anna Marie Johnson, Claudene Sproles, Samantha McClellan, Rosalinda Hernandez Linares, (2014), "Library instruction and information literacy 2013", Reference Services Review, Vol. 42 Iss 4 pp. 603-715 <http://dx.doi.org/10.1108/RSR-07-2014-0028>

Maryam Derakhshan, Diljit Singh, (2011), "Integration of information literacy into the curriculum: a meta-synthesis", Library Review, Vol. 60 Iss 3 pp. 218-229 <http://dx.doi.org/10.1108/00242531111117272>

UNIVERSITAS  BAKRIE

Access to this document was granted through an Emerald subscription provided by emerald-srm:522011 []

### For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit [www.emeraldinsight.com/authors](http://www.emeraldinsight.com/authors) for more information.

### About Emerald [www.emeraldinsight.com](http://www.emeraldinsight.com)

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

\*Related content and download information correct at time of download.



# An information literacy integration model and its application in higher education

An information literacy model

703

Li Wang

*Information Commons, The University of Auckland Library,  
Auckland, New Zealand*

Received 7 July 2011  
Revised 9 August 2011  
Accepted 9 August 2011

## Abstract

**Purpose** – The purpose of this paper is to present a model for curricular integration of information literacy for undergraduate programs in higher education.

**Design/methodology/approach** – Data are drawn from individual interviews at three universities in Australia and curricular integration working experience at a New Zealand university. Sociocultural theories are adopted in the research process and in the development of the model.

**Findings** – Key characteristics of the curriculum integration of information literacy were identified and an information literacy integration model was developed. The S<sup>2</sup>J<sup>2</sup> key behaviours for campus-wide multiple-partner collaboration in information literacy integration were also identified.

**Research limitations/implications** – The model was developed without including the employer needs. Through the process of further research, the point of view of the employer on how to provide information literacy education needs to be explored in order to strengthen the model in curricular design.

**Practical implications** – The information literacy integration model was developed based on practical experience in higher education and has been applied in different undergraduate curricular programs. The model could be used or adapted by both librarians and academics when they integrate information literacy into an undergraduate curriculum from a lower level to a higher level.

**Originality/value** – The information literacy integration model was developed based on recent PhD research. The model integrates curriculum, pedagogy and learning theories, information literacy theories, information literacy guidelines, people and collaboration together. The model provides a framework of how information literacy can be integrated into multiple courses across an undergraduate academic degree in higher education.

**Keywords** Information literacy integration model, Information literacy curriculum, Higher education, Sociocultural approach, Information literacy, Modelling, Students, Australia, New Zealand

**Paper type** Research paper

## 1. Introduction

There are strong professional interests in and scholarship around the curricular integration of information literacy in higher education. This paper introduces a model for curricular integration of information literacy in undergraduate programs in higher education. The model was developed based on recent research conducted at four universities in Australia and New Zealand.

The author offers special thanks to her supervisors, Professor Christine Bruce and Dr Hilary Hughes for their guidance and input for this research and the development of the model. She also thanks all the people who have participated in the interviews and the curriculum development phases of this research.



This paper begins with an introduction, which discusses the concept of integration of information literacy and why it is an effective approach to information literacy education. Then it explains research methodology based on sociocultural theories and how it was applied in the model development. Next, the details of the model are explained. This is followed by consideration of the application of the model in an undergraduate program in higher education.

Currently there are four main approaches to information literacy education in higher education:

- (1) extra-curriculum: a course outside of academic curriculum;
- (2) inter-curriculum: a session(s) add-in to an academic course;
- (3) intra-curriculum: integrated into a course; and
- (4) stand-alone: an independent course(s) within academic curricula (Eisenberg *et al.*, 2004; Peacock, 2006). The intra-curricular approach, also known as the curricular integration or embedded approach, is defined by the Association of College and Research Libraries (ACRL) *Information Literacy Competency Standards for Higher Education* as being “woven into the curriculum’s content, structure and sequence” (Association of College and Research Libraries, 2001, p. 5).

Both “integration” and “embedding” are used interchangeably in the literature. In this article, both terms mean the same as the ACRL definition above. The curricular integration approach is advocated by both the ACRL *Information Literacy Competency Standards for Higher Education* (Association of College and Research Libraries, 2001) and the Australian and New Zealand Institute of Information Literacy (ANZILL) *Information Literacy Framework* (Bundy, 2004). These information literacy frameworks propose that the integration of information literacy into curricula is the most effective way of providing information literacy education. Bruce (1997) argues that “information literacy cannot be learned without engaging the discipline specific subject matter” (p. 60). Therefore, students need to learn about discipline content as they seek and use information. This is supported by several studies (Feldmann and Feldmann, 2000; Hartmann, 2001; Milne, 2004; Welker *et al.*, 2005; Williams *et al.*, 2004). Nerz (Nerz and Weiner, 2001; Nerz and Bullard, 2006) has many years of experience working with academic staff in teaching information literacy to undergraduates. Nerz argues that: “By linking information competencies to existing (or new) assignments related to class material, instructors and librarians have moved beyond decoupled instruction which is quickly forgotten, to ‘just in time’ needs based content” (p. 16). Jacobson and Mark (2000) also conclude that, from their years of experience of teaching undergraduates, the integration approach is the most effective.

In the literature, there are many practical examples of academic staff and librarians who have used this approach and worked collaboratively to integrate information literacy into academic courses (Callison *et al.*, 2005; Dakshinamurti and Horne, 2006; Floyd *et al.*, 2008; Kobzina, 2010). A research-based information literacy integration model would be very useful for practitioners to use or adapt to design information literacy curriculum and to integrate information literacy into curriculum. The author has recently conducted research as part of her PhD study (Wang, 2010) to investigate how information literacy can be integrated across an undergraduate academic

---

program from a lower level to a higher level and to develop an information literacy curricular integration model.

## **2. Research approach to inform and develop an information literacy integration model**

The research was based on sociocultural theories, which describe learning as being embedded within social events and occurring as a learner interacts with other people, objects, and events in a collaborative environment (Vygotsky, 1978). The sociocultural approach was adopted in both the interview and the development phases of this research. Underpinned by sociocultural theories, this study is based on a number of assumptions:

- that knowledge is socially constructed and that the social nature of cognitive development serves as a powerful dialogic model for understanding how information literacy could be integrated into the curriculum in a community of practice; and
- that tools have played an important role in these social interactions.

In the interview phase, the author conducted semi-structured interviews with a sample of 23 academic staff and librarians who have had information literacy curricular integration experience from three Australian universities. The author intentionally dialogued with the selected experienced librarians and academic staff to share their knowledge and experience of the curricular integration of information literacy. They used the curriculum plan, assessment tools, information literacy activity examples as interactive tools with which to share their experiences of the way in which information literacy was integrated into course contexts such as assignments or course activities.

Key characteristics of information literacy integration were identified from these interviews and further reinforced at the curriculum development phase: collaboration and negotiation, contextualisation and ongoing interaction with information. For example, the curricular integration of information literacy can be achieved with the campus collaboration of multiple departments including course lecturers, librarians, learning support and information technology (IT) support. Information literacy needs to be contextualised in the course content, activities, assignment and course assessment.

In the development phase, the author established four curricular working groups from Year 1 to Year 4 in a fourth university in New Zealand. Academic staff, librarians, learning designers, learning advisors, IT support staff and the author worked collaboratively in these curriculum groups to design information literacy curriculum and to integrate information literacy across an academic program from Year 1 to Year 4. In this phase, a community of information literacy integration practice was formed according to sociocultural theories. In this community, each group member shared their common understanding of the purpose of the information literacy integration and brought in their expertise knowledge to the group. For example, course lecturers are well versed in their subject field and know what is expected of students in a particular course or degree programme. Librarians brought not only their expert knowledge on a variety of information resources and the skills required for effectively searching for information, but also for managing and evaluating information for subject discipline applications. Student learning advisors brought their expertise in skills such as

writing, summarising, annotating bibliographies, thinking critically, referencing and citing skills. Learning developers assisted by supporting curricular design and assessment. IT staff support online learning activities such as online peer-reviews system.

All group members worked together to complete the agreed tasks with trust and support. For example, in order to assist Year 1 students to search and evaluate websites and to find out what electrical or electronic or computer system engineers do. The subject librarian modelled career research for librarianship on the internet and documented the search strategies. She went through the research process and presented the evaluation sheet that she had used to evaluate the information found. Based on the information provided by the subject librarian, the student learning advisor then wrote a sample report on a topic of "What do subject librarians do?" to demonstrate to students how to write a short report about a career. She also developed a report sample for students. The subject librarian, the student learning advisor and the researcher worked collaboratively to develop a web resource evaluation template and examples. An online peer review system was introduced for students to peer review each other's work in a collaborative online learning environment. IT support staff provided online peer review support for students to peer review and mark each other's work online. The researcher worked with the course lecturers and the student learning advisor to draft a marking schedule for students to peer mark their fellow students' work. The integration of information literacy provided an opportunity for collaboration in offering to students the best support possible.

In this community of information literacy practice, the collaboration has been extended from academic and librarian collaboration to the diversified campus-wide multiple partner collaboration. Key behaviours of collaboration have been identified as S<sup>2</sup>J<sup>2</sup>:

- *Shared understanding* – Partners need to have a shared understanding of the purpose and importance of curricular integration of information literacy and the outcomes of information literacy integration.
- *Shared knowledge* – Partners share specialised knowledge and provide support from different areas of expertise, such as subject knowledge, information resources, writing, referencing, learning design, and IT.
- *Joint dialogue with respect and tolerance* – Partners need to interact, negotiate and communicate to achieve the same goals with mutual respect and tolerance.
- *Joint efforts with trust and support* – Partners need to work together to complete the agreed tasks with a high level of trust and support. The curricular integration of information literacy can involve intensive tasks including, the designing of assignments, designing of class or online activities, developing teaching resources and support material, developing assessment methods, and marking information literacy work. All partners need to make contribution and commitment to carry out the agreed tasks in the integration of information literacy.

Based on the key findings from the interviews and the practical information literacy integration experience, an information literacy integration model was gradually formed and developed.

### 3. The key elements of the information literacy integration model

The key elements of the information literacy integration model are shown in Figure 1. The model includes three key interconnected components, i.e. what, who and how. The intended outcome of the model is to enable students to be information literate.

The “what” element deals with the information literacy guidelines in the intended curriculum (i.e. what the university intends to teach). These guidelines include the institutional graduate information literacy attributes or profiles, the graduate information literacy requirements required by an accrediting professional organization, and the institutional or national information literacy policies such as the institutionally endorsed information literacy standards, institutional information literacy policies, or related national information literacy strategies.

The “who” element deals with the people who are involved in the information literacy curricular integration group by answering questions such as:

- Who are the key stakeholders in information literacy integration?
- Who is involved in the information literacy curricular working group?
- How to collaborate?

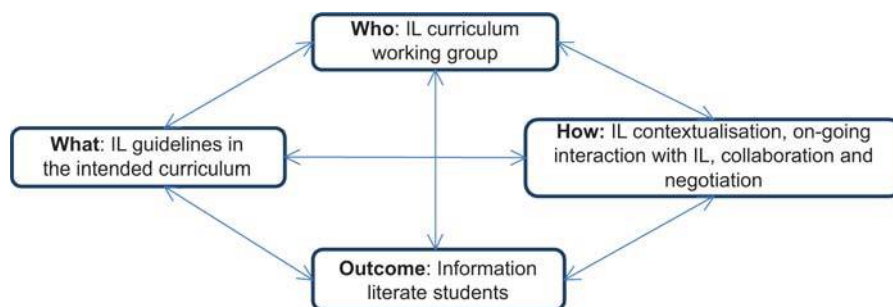
It also discusses how to analyse and understand an academic programme curriculum in order to identify core courses and course coordinators and establish personal relationships between academic staff and librarians.

The “how” element explores the process of information literacy integration curricular development. It includes how information literacy can be integrated across the curriculum by contextualising information literacy in the academic curriculum, how to provide students with an ongoing interaction with information throughout a single course and across multiple courses, and how to apply learning theories and pedagogy to the information literacy curricular design.

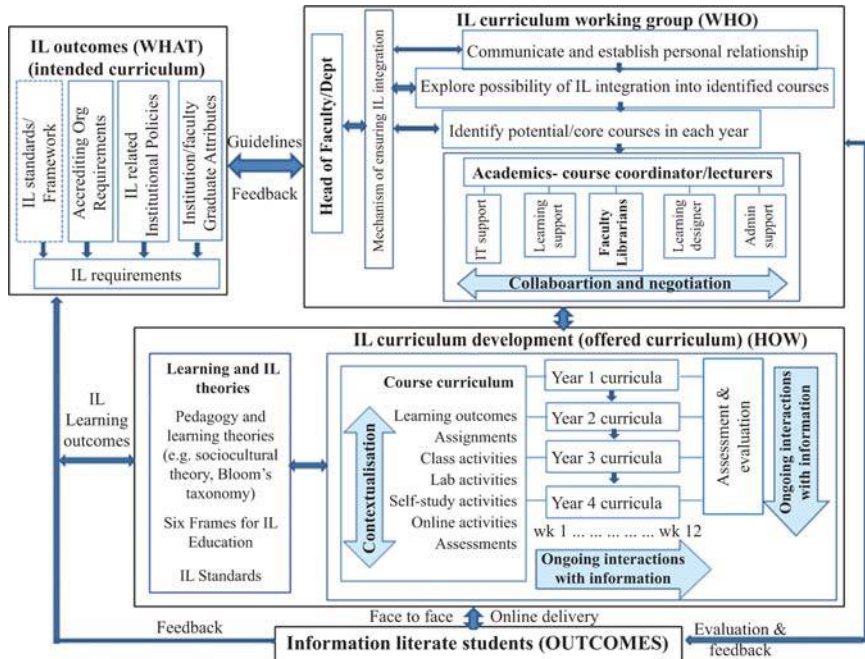
The information literacy curricular integration model and each element of the model are discussed in detail in the next section.

### 4. The information literacy curriculum integration model

The information literacy integration model is shown in Figure 2. The model represents the processes, people and resources essential for information literacy integration. The two-headed arrows indicate that this is a fluid, continuous process. The model represents the importance of information literacy guidelines and pedagogic theories in information literacy curricular development. It demonstrates that information literacy



**Figure 1.**  
Key components of the IL integration model



**Figure 2.**  
An information literacy  
integration model

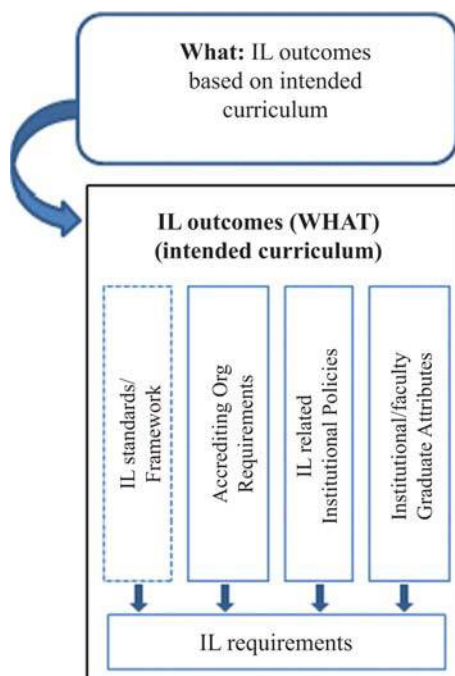
should be integrated into the intended curriculum and the offered curriculum (what the teachers teach) as well as the students' received curriculum (what students actually learn). The model also reveals that a higher education curriculum can be redesigned and negotiated at different levels: the institutional level, programme level and at course or class levels.

The model consists of three inter-connected elements; each of these elements is discussed in detail in the following sections.

#### 4.1 What: the information literacy guidelines in the intended curriculum

This section presents the *WHAT* element of information literacy integration model in more detail as shown in Figure 3.

The research data showed that information literacy is included in the intended curricula (what an institution expects its students to learn) of many universities such as: Graduate Attributes (Barrie, 2007; Bridgstock, 2009) or institutional teaching and learning strategies (Corrall, 2007). Therefore, in the integration model, information literacy is presumed to be included in these intended curricula. These graduate attributes and graduate requirements or teaching strategies can be used as guidelines; these guidelines state the importance of information literacy and what information literate students should be like. Information literacy standards or frameworks are also listed as a possible institutional intended curriculum when they are endorsed by an institution. For example, the ANZIL's information literacy framework (Bundy, 2004) is used as a guideline in curricular design and development to enable students to access, evaluate, organise, apply and use information to learn, to solve problems and to make decisions.



**Figure 3.**  
The "what" element of the IL integration model

The comparison table (Table I) demonstrates clearly the connection between graduate requirements and information literacy standards as well as the importance of information literacy.

#### 4.2 Who: the information literacy curricular working group

This section discusses the "who" element of the information literacy integration model as shown in Figure 4.

This element of the model outlines the key stakeholders in the information literacy curricular integration, how to communicate and establish personal relationships between academic staff and librarians and the effective ways to collaborate when working with multiple parties in designing information literacy curriculum. The model suggests that librarians play a proactive role in the curricular integration of information literacy. However, the bottom-up approach to integrating information literacy will only happen when the course coordinators and lecturers are aware of the importance of information literacy and are willing to have it integrated into their course curriculum. The heads of faculties or departments are important in the top-down approach. The bottom-up approach here means that the curricular integration of information literacy is implemented by individual teaching staff including lecturers and librarians. The top-down approach here means the curricular integration of information literacy is endorsed by the institute or by the department. Student needs and student feedback are very important in information literacy curricular design and integration.

The next section explores the development of information literacy integration and information literacy curricular design.

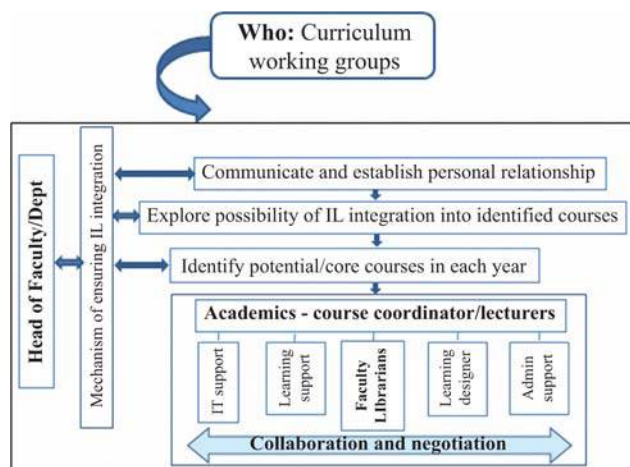


IPENZ Graduate competency profiles (Institution of Professional Engineers New Zealand, 2009)	University of Auckland Graduate Profile (The University of Auckland, 2003)	ANZIIL IL Standards (Bundy, 2004)
4. Able to recognise when further information is needed and be able to find it by identifying, evaluating and drawing conclusions from all pertinent sources of information. Designing and carrying out experiments. Locating, searching and selecting relevant data from codes, databases and literature	II5. An ability to recognise when information is needed and a capacity to locate, evaluate and use this information effectively	1, 2, and 3. The information literate person recognises the need for information and determines the nature and extent of the information needed; accesses needed information effectively and efficiently. Critically evaluates information and the information seeking process
8. Communicate clearly by being able to comprehend and produce effective reports and design documentation, summarise information, make effective oral presentations and to give and receive clear oral instructions	II7. Ability to access, identify, organise and communicate knowledge effectively in both written and spoken English and/or Maori	5. The information literate person applies prior and new information to construct new concepts or create new understandings. Communicates knowledge and new understandings effectively
9. Be aware of the role of engineers and their responsibility to society by demonstrating understanding of the general responsibilities of a professional engineer	II4. Intellectual integrity, respect for truth and for the ethics of research and scholarly activity	6. The information literate person uses information with understanding and acknowledges cultural, ethical, economic, legal, and social issues surrounding the use of information
4. Able to synthesise and demonstrate the suitability and efficacy of solutions to part or all of complex engineering problems	II2. An understanding and appreciation of current issues and debates in the major fields of knowledge studied	5. The information literate person applies prior and new information to construct new concepts or create new understandings
	12. An understanding and appreciation of current issues and debates in the major fields of knowledge studied	2.4 The information literate person keeps up to date with information sources, information technologies, information access tools and investigative methods
	III. A capacity for critical, conceptual and reflective thinking	3. The information literate person critically evaluates information and the information seeking process

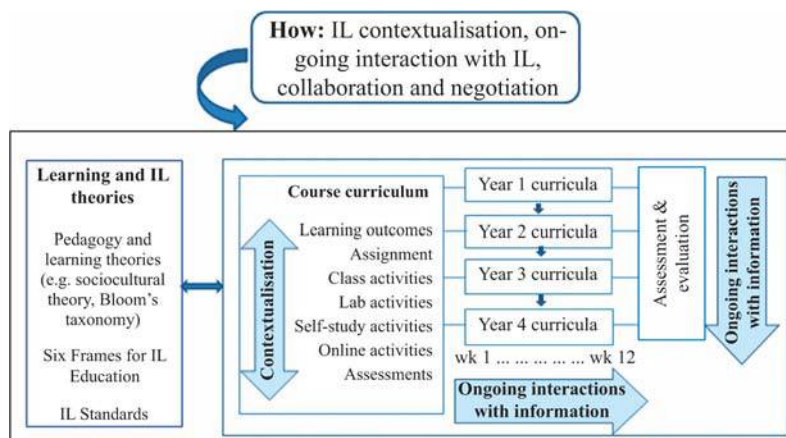
**Table I.**  
IL related attributes chart extracted from the intended curricula

*4.2 How: information literacy integration curricular development*

This section details the “how” element of the information literacy integration model, i.e. how to design information literacy curriculum based on student-centred learning theories and information literacy theories. The “how” element is shown in Figure 5.



**Figure 4.**  
The “who” element of the IL integration model

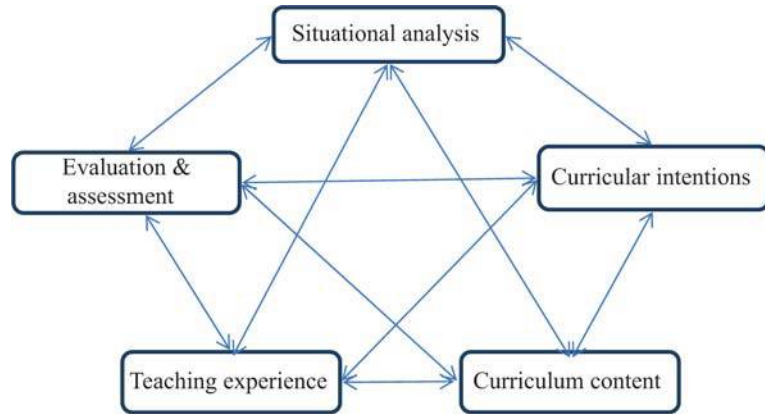


**Figure 5.**  
The “how” element of the IL integration model

The information literacy integration process is in fact a process of information literacy curricular development. In order to explain the process of the information literacy curricular development in detail, McGee’s curricular development model (McGee, 1997) will be compared with the information literacy integration model.

McGee’s model was chosen because it was developed based on five well-known curricular development models devised between 1949 and 1992. As shown in Figure 6, McGee’s model contains five essential interconnected components of curricular development:

- (1) situational analysis;
- (2) aims, goals and objectives (curricular intentions);
- (3) selection of content;
- (4) teaching experience; and
- (5) evaluation and assessment.



Source: McGee (1997)

**Figure 6.**  
McGee's curricular  
development model

“Situational analysis” means to analyse the situation in which a curriculum is planned and delivered. The situation includes both external factors and internal factors, such as resources and a student’s background and abilities. Setting clear intentions and objectives is an important part of curricular development and lecturers need to know the broader educational context in which they work, as well as their specific teaching context.

Curricular intentions should be based on requirements outlined in institutional documents, programme or course curriculum documents.

“Curricular content” includes organising knowledge into subjects or disciplines. It considers the central question in curricular development: what should university teach? The subject-based knowledge has been challenged by more recent views of knowledge, such as culture-based (Powers, 2006; Young, 2008), employment-based (Benefer, 2007; Choy *et al.*, 2008; Evans *et al.*, 2008) and student-based (Stes *et al.*, 2008; Wiggan, 2007). The criteria for selecting content suggested by McGee are validity, significance, interest, learnability and consistency with social reality.

“Teaching experience” involves how the planned curriculum might be put into practice in the classroom. It focuses on questions relating to what teaching strategies are known to be effective and what learning experiences are appropriate for students.

The last component in McGee’s model is assessment and evaluation. This focuses on such questions as:

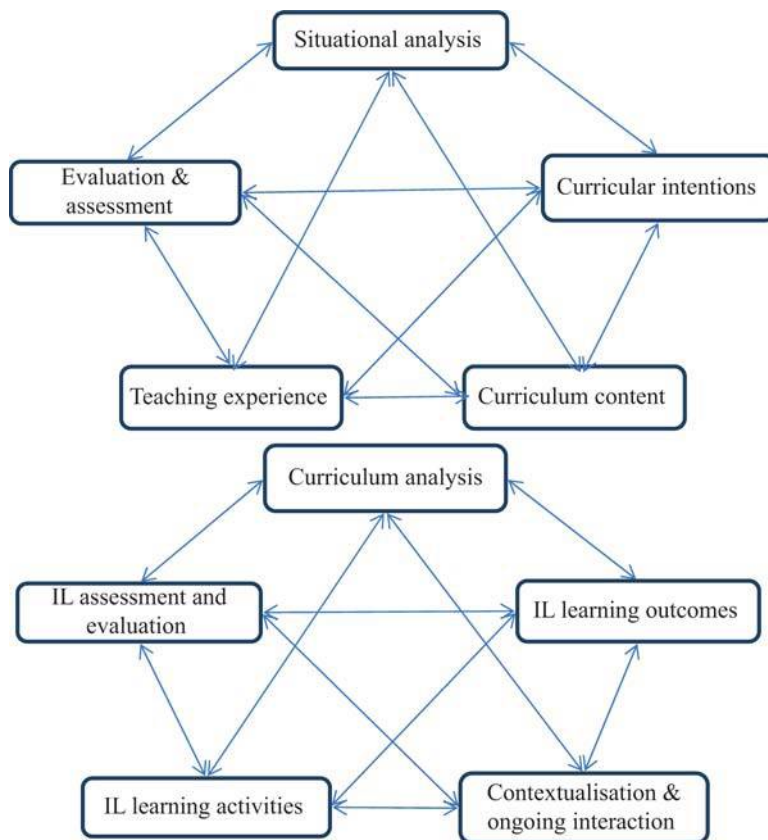
- How do lecturers know when their intentions and learning experiences have worked?
- How would they know if their students have gained knowledge?
- Has the course’s curricular design been effective?

According to McGee (1997), before lecturers start their teaching, they need to think about what happens before teaching something, what happens during the teaching, and what happens after it. The five components in McGee’s model reflect the thinking process of curricular development.

McGee’s model presents general curricular development and is useful when developing a curriculum. The information literacy integration model is very similar to the McGee’s general curricular development model but with an emphasis of information literacy integration, as Figure 7 shows.

The information literacy integration model reflects the five key inter-connected components that have been identified in McGee’s model:

- (1) The “curriculum analysis” component in the information literacy integration model is similar to the “situational analysis” component in McGee’s model, but it focuses on the curriculum analysis of intended curriculum and academic and programme curriculum. In the information literacy integration model, before designing the information literacy component, it is important to understand the intended curriculum, the faculty curriculum in question.
- (2) The “IL learning outcome” component is similar to the “curriculum intention” in McGee’s model. However, McGee’s model focuses more on teachers than on students. The information literacy integration model focuses on students and is concerned more about the outcomes of student learning. Based on Bloom’s taxonomy, different information literacy learning outcomes can be developed



**Figure 7.** Comparison of the information literacy model and McGee’s model

for the junior and senior years. Based on these information literacy learning outcomes, the information literacy curriculum can be planned and designed.

- (3) The “contextualisation and ongoing interaction” component is similar to the “curriculum content” component in McGee’s model. Contextualising information literacy in an academic curriculum and providing students with ongoing interaction with information is a key content requirement in the information literacy integration curriculum.
- (4) The “IL learning activities” component is similar to the “teaching experience” component in McGee’s model. Again, the information literacy integration model focuses more on students’ learning experiences, while McGee’s is focused more on the teaching experience of teachers. Some of the information literacy learning activities identified in the course of this study are presented in the following section.
- (5) The “IL assessment and evaluation” is similar to the “curriculum assessment and evaluation” in McGee’s model. The information literacy integration model focuses on information literacy assessment and evaluation.

The above analysis shows that the process of information literacy curricular development is the process of curricular development. This process includes curriculum analysis; information literacy learning outcome development; information literacy contextualization; learning activity design; and the development of information literacy assessment and evaluation. Wang’s study (Wang, 2010) explains the details of how to develop information literacy curriculum. For example, how to analyse faculty curriculum in order to integrate information into curriculum; how to contextualise information literacy into course context, class activities or learning outcomes; how to develop information literacy learning outcomes in each year of an undergraduate programme in higher education by applying Bloom’s taxonomy.

## 5. An example of applying the information literacy curricular integration model

This section presents an example of applying the model to integrate information literacy into an engineering undergraduate program curriculum in higher education.

### 5.1 *Understanding the faculty intended curriculum*

The information literacy curricular model has been applied in an engineering program at the University of Auckland, New Zealand from Year 1 to Year 4. Based on the information literacy integration model, engineering subject librarians, working with learning services librarians, analysed the faculty and university intended curricula. These include the university teaching and learning policies, such as Graduate Profiles, institutional teaching and learning strategies, and the information literacy policy, the Institution of Professional Engineers New Zealand (IPENZ) requirement for engineering undergraduate students. All information literacy related components from these policy documents have been extracted and placed in a comparison chart (Table I).

Table I clearly incorporates the answers to the questions such as “What is information literacy?”, “What should information literate students be like?”, and “What are the graduates required to know by the accrediting professional organisation in

terms of information literacy?” It is essential to clarify the answers to these questions in order that academic staff, librarians and other collaborative parties have a clear understanding of why information literacy is important and why it needs to be integrated into the curriculum. These intended curricula were used as guidelines for discussions with academic staff or librarians or when planning and designing the information literacy curricula.

### *5.2 Analysing an undergraduate academic curriculum*

In order to integrate information literacy across an undergraduate academic curriculum program, it is important to understand the academic curriculum and identify potential courses in each year for information literacy integration. All course information and associated course coordinators/lecturers for an undergraduate academic program were obtained through the Departmental Manager and also via the faculty website. The engineering subject librarians working with learning services librarians analysed all core courses and elective courses offered in each year from Year 1 to Year 4.

The librarians analysed the potential courses in which information literacy can be integrated into the course content, assignments and the course coordinators/lecturers. One potential course and course coordinator in each year from Year 1 to Year 4 were identified. The engineering subject librarians contacted these identified course coordinators and lecturers to establish curriculum working groups. One information literacy curricular working group in each year was formed from Year 1 to Year 4. The curricular groups consisted of course coordinators and lecturers, a librarian, learning services librarian, and a learning designer. The curricular groups may also include a student learning advisor and IT support staff. The S<sup>2</sup>J<sup>2</sup> collaborative approach identified through the research was applied in these curricular working groups.

### *5.3 Developing information literacy curriculum*

Each curricular working group worked collaboratively and redesigned information literacy curriculum by integrating information literacy into course learning objectives, assignments, class activities, lab activities, self-learning activities, online learning activities, assessment.

For example, in a Year 1 course, information literacy was integrated into the course project that was worth 21 per cent of the course grade. There were three parts in this project.

In Part One, students were required to develop information research skills to find information about biofuels and bioenergy. Information literacy tutorial and library tour were offered to students and this was followed up by an online information literacy quiz.

In Part Two, students drew on the information literacy and research skills developed in Part One to find the definitions for a set of biofuel related terms and applied these terms in a learning context to further understand their meaning. Students were required to put together a list of the information sources that they had used in a bibliography using the Faculty of Engineering referencing style. Information on avoiding plagiarism and the relevant university policy were included in the course lecture and some questions were also included in the information literacy quiz which reinforced the students' understanding of the avoidance of plagiarism.

The integration of information literacy in this project enabled students to recognise when information is needed and a capacity to locate and use information effectively as stated in the Intended curriculum (The University of Auckland, 2003) in Table I.

In a Year 2 course, information literacy was integrated into the course objectives and class activities. The objectives of the course were to introduce students to land information systems, and modern methods of gathering, processing and presenting information for engineering purposes. The first information literacy lecture was presented by the subject librarian and was designed to help students to find civil resources and land information resources for their assignments, effectively. A hands-on tutorial followed to allow students to do hands-on exercises to reinforce what had learnt during the lecture. After that, students were required to do an online test which focused on how to find civil and environmental engineering resources and databases search skills. The assignment was worth 5 per cent of the course mark.

Late in the semester, the subject librarian was invited to the class again to co-teach another information literacy lecture in which to analyze the common mistakes or problems found from the online test and also to introduce students on how to find specific land information such as the population in certain area or zone information in Auckland. A set of land information related questions were provided to students in order for them to explore the answers by using databases and to reinforce skills learnt. There was another information online test towards the end of the semester; this was worth 5 per cent of the course mark. The questions were all related to land information, for example, "Please identify the number of different planning zones between Clifton Road and Hamilton Road. What are the main features of Residential zone 1?"

The integration of information literacy in this course reinforce what students have learned in Year 1 to locate and use information effectively as stated in the intended curriculum (The University of Auckland, 2003) in Table I.

In a Year 3 course, information literacy was integrated into this course assignment and assessment. The Appendix shows an example of the information literacy related assignment. The example demonstrates how information literacy can be contextualised in an engineering course assignment. The assignment requires students to act as engineering consultants and to work in a group of three to write a report recommending three ways of measuring river flow. In order to produce the report, students need to explore and evaluate information from required sources such as books, journals, conferences and patents. In this learning context, students were required to use information to learn and to complete their study tasks. When they completed their tasks and wrote a report, they not only learn the subject knowledge, but their ability to search for information and to evaluate information. The integration of information literacy in this course enabled students to improve their capability of evaluation and applying information in a new learning environment and to generate new knowledge. In addition, by completing this assignment, their teamwork skills will also be enhanced.

## 6. Conclusion

The information literacy integration model has been successfully applied to the Engineering program. Currently the model is adopted in the curricular analysis for Planning, Education, Pacific Studies and Science undergraduate curricular programs at the University of Auckland, New Zealand. The practical application demonstrates

---

that the model enables information literacy educators and librarians to understand the various aspects of the curricular integration of information literacy and the relationships between them. The model can be adapted and provides a powerful tool in information literacy curricular integration in different subject disciplines. It also provides a framework of how information literacy can be integrated into multiple courses across an academic degree in higher education.

## References

- Association of College and Research Libraries (2001), *Information Literacy: Competency Standards for Higher Education*, available at: [www.ala.org/ala/mgrps/divs/acrl/standards/standards.pdf](http://www.ala.org/ala/mgrps/divs/acrl/standards/standards.pdf) (accessed 11 August 2011).
- Barrie, S. (2007), "Academics' understandings for generic graduate attributes: a conceptual basis for lifelong learning", in Hager, P. and Holland, S. (Eds), *Graduate Attributes, Learning and Employability*, Springer, New York, NY, pp. 149-67.
- Benefer, R. (2007), "Engaging with employers in work-based learning: a foundation degree in applied technology", *Education+Training*, Vol. 49 No. 3, pp. 210-7.
- Bridgstock, R. (2009), "The graduate attributes we've overlooked: Enhancing graduate employability through career management skills", *Higher Education Research & Development*, Vol. 28 No. 1, pp. 31-44.
- Bruce, C.S. (1997), *The Seven Faces of Information Literacy*, Auslib Press, Adelaide.
- Bundy, A. (2004), *Australian and New Zealand Information Literacy Framework: Principles, Standards and Practice*, Australia and New Zealand Institute for Information Literacy.
- Callison, R., Budny, D. and Thomes, K. (2005), "Library research project for first-year engineering students: results from collaboration by teaching and library faculty", *Reference Librarian*, Nos 89/90, pp. 93-106.
- Choy, S.C., Bowman, K., Billet, S., Wignall, L. and Haukka, S. (2008), *Effective Models of Employment-based Training*, technical report, available at: <http://eprints.qut.edu.au/13630/1/13630.pdf> (accessed 2 August 2011).
- Corrall, S. (2007), "Benchmarking strategic engagement with information literacy in higher education: towards a working model", *Information Research*, Vol. 12 No. 4.
- Dakshinamurti, G. and Horne, L. (2006), "Integrating information literacy in a first-year university course: a case study from Canada", paper presented at the World Library and Information Congress: 72nd IFLA General Conference and Council, available at: [www.ifla.org/IV/ifla72/papers/125-Dakshinamurti\\_Horne-en.pdf](http://www.ifla.org/IV/ifla72/papers/125-Dakshinamurti_Horne-en.pdf) (accessed 6 July 2011).
- Eisenberg, M.B., Lowe, C.A. and Spitzer, K.L. (2004), *Information Literacy: Essential Skills for the Information Age*, Libraries Unlimited, London.
- Evans, A., Hawksley, F., Holland, M. and Caillau, I. (2008), "Improving subject knowledge and subject pedagogic knowledge in employment-based secondary initial teacher training in England", paper presented at the Annual Conference of the Association of Teacher Education in Europe. available at: <http://shura.shu.ac.uk/187/1/fulltext.pdf> (accessed 1 August 2011).
- Feldmann, L. and Feldmann, J. (2000), "Developing information literacy skills in freshmen engineering technology students", paper presented at the 30th Annual Frontiers in Education Conference, available at: [http://ieeexplore.ieee.org/xpl/freeabs\\_all.jsp?arnumber=896650](http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=896650)



- Floyd, D.M., Colvin, G. and Bodur, Y. (2008), "A faculty-librarian collaboration for developing information literacy skills among preservice teachers", *Teaching and Teacher Education*, Vol. 24 No. 2, pp. 368-76.
- Hartmann, E. (2001), "Understandings of information literacy: the perceptions of first year undergraduate students at the University of Ballarat", *Australian Academic & Research Libraries*, Vol. 32 No. 2, pp. 110-22.
- Institution of Professional Engineers New Zealand (2009), "Graduate competency profiles", available at: [www.ipenz.org.nz/ipenz/Education\\_Career/accreditation/Graduate\\_Competenc\\_Profiles\\_Nov\\_2009.pdf](http://www.ipenz.org.nz/ipenz/Education_Career/accreditation/Graduate_Competenc_Profiles_Nov_2009.pdf) (accessed 3 August 2011).
- Jacobson, T. and Mark, B.L. (2000), "Separating wheat from chaff: helping first-year students become information savvy", *The Journal of General Education*, Vol. 49 No. 4, pp. 256-78.
- Kobzina, N.G. (2010), "A faculty-librarian partnership: a unique opportunity for course integration", *Journal of Library Administration*, Vol. 50 No. 4, pp. 293-314.
- McGee, C.F. (1997), *Teachers and Curriculum Decision-making*, Dunmore Press, Palmerston North.
- Milne, C. (2004), "Learning Outcomes and Information Literacy", in SCONUL (Ed.), SCONUL, London, pp. 9-21.
- Nerz, H. and Bullard, L. (2006), "The literate engineer: Infusing information literacy skills throughout an engineering curriculum", *2006 ASEE Annual Conference Program: Advancing Scholarship in Engineering Education : Final Conference Program & Proceedings, June 18-21, Chicago, IL*, American Society for Engineering Education, Washington, DC.
- Nerz, H. and Weiner, S. (2001), "Information competencies: a strategic approach", paper presented at the ASEE Annual Conference & Exposition: Peppers, Papers, Pueblos, and Professors, available at: [www.temp.asee.org/conferences/annual/pdf/upload/2001-Best-Overall-Paper-and-PIC-IV-Best-Paper.pdf](http://www.temp.asee.org/conferences/annual/pdf/upload/2001-Best-Overall-Paper-and-PIC-IV-Best-Paper.pdf)
- Peacock, J. (2006), "THINK systemically, ACT strategically: sustainable development of information literacy in the broader context of students' learning", paper presented at IATUL: Embedding Libraries in Learning and Research, available at: <http://eprints.qut.edu.au/6946/> (accessed 12 June 2011).
- Powers, K.M. (2006), "An exploratory study of cultural identity and culture-based educational programs for urban American Indian students", *Urban Education*, Vol. 41 No. 1, pp. 20-49.
- Stes, A., Gijbels, D. and Petegem, P.V. (2008), "Student-focused approaches to teaching in relation to context and teacher characteristics", *Higher Education*, Vol. 55 No. 3, pp. 255-67.
- (The) University of Auckland (2003), "Graduate profile", available at: [www.auckland.ac.nz/uaa/home/about/teaching-learning/principles](http://www.auckland.ac.nz/uaa/home/about/teaching-learning/principles) (accessed 2 August 2011).
- Vygotsky, L.S. (1978), *Mind in Society: The Development of Higher Psychological Processes*, Harvard University Press, Cambridge, MA.
- Wang, L. (2010), "Integrating information literacy into higher education curricula: An information literacy curricular integration mode", unpublished PhD thesis, Queensland University of Technology, Queensland, available at: <http://eprints.qut.edu.au/41747/> (accessed 7 July 2011).
- Welker, A.L., Quintiliano, B. and Green, L. (2005), "Information literacy: skills for life", *Proceedings of the ASEE Annual Meeting: The Changing Landscape of Engineering and Technology Education in a Global World, Portland, OR, 12-15 June*.

- Wiggan, G. (2007), "Race, school achievement, and educational inequality: toward a student-based inquiry perspective", *Review of Educational Research*, Vol. 77 No. 3, pp. 310-33.
- Williams, B., Blowers, P. and Goldberg, J. (2004), "Integrating information literacy skills into engineering courses to produce lifelong learner", paper presented at the ASEE Annual Conference & Exposition: Staying in Tune with Engineering Education, available at: [www.soa.asee.org/paper/conference/paper-view.cfm?id=20211](http://www.soa.asee.org/paper/conference/paper-view.cfm?id=20211)
- Young, P.A. (2008), "The culture based model: constructing a model of culture", *Educational Technology & Society*, Vol. 11 No. 2, pp. 107-18.

### Further reading

- Australia and New Zealand Institute of Information Literacy (2008), "ANZIIL current members", available at: [www.anziil.org/membership/currentmembers.htm](http://www.anziil.org/membership/currentmembers.htm) (accessed 30 June 2011).
- Bennett, O. and Gilbert, K. (2009), "Extending liaison collaboration: partnering with faculty in support of a student learning community", *References Services Review*, Vol. 37 No. 2, pp. 131-42.
- Cunningham, T.H. and Lanning, S. (2002), "New frontier trial guides: faculty-librarian collaboration on information literacy", *Reference Services Review*, Vol. 30 No. 4, pp. 343-8.
- McGuinness, C. (2006), "Collaborating for information literacy development (ILD): exploring the dynamic effect of academic-librarian relationships on information literacy development programmes in undergraduate education", paper presented at Librarians' Information Literacy Annual Conference (LILAC), University of Leeds, Leeds.

### Appendix, Contextualising information literacy into a course assignment example

#### Group research project

*Project overview and requirement.* By doing this group research project, you will research and extend your knowledge on river flow measurements. This project will also develop a range of skills required by both the University of Auckland Graduate Profile and Professional organisation for accreditation of the University of Auckland BE programme.

Your group of three engineering consultants (the team will be randomly assigned by the lecturer) has been commissioned to produce a 2,000-word report recommending three ways of measuring river flow in the Waikato River, downstream from the Huntley Power Station. Reliable measurements of river flow are important for water resources management and for the water supply to the Waikato region. Your report should provide arguments and evidence to support your recommendations.

There are two parts to this project:

- Part I – You need to explore information from a variety of sources, including books, academic journals, conference papers and patents. You must demonstrate an understanding of the usefulness of different types of information sources. This will be accessed via the online learning management quiz and the final report.
- Part II – Your group will use the information resources identified in Part I to produce a consultant's report. You will need to use the same report template that you learnt in the previous course. You are required to include a reference list using APA reference style at the end of the report to acknowledge the information sources that you have used. This list should contain, at the least, references from books, academic journals, conference papers and patents. For the details of the report requirement refer to the Marking Schedule. You are required to submit an electronic copy of the report via Turnitin. You are also required to hand in a print copy of the report. The print copy of the report must be accompanied by a photocopy of the first page of all the articles or book chapters that you have used. The

due date is Monday 29/9 at 4 pm. The details of where and how to sign in Turnitin will be provided on the learning management system.

*Assessment.* The project is worth 15 per cent of the course final mark, which comprises 3 per cent online quiz and 12 per cent final report as detailed below:

- Information resources individual online quiz: 3 per cent and due by 4 pm on Friday 29/08.
- Final group report – submitting both e-copy via Turnitin and print copy: 12 per cent and due by 4 pm on Wednesday 29/9.

Statement of Contribution of Team Members to the Report Work (the form template will be available on Learning Management system): due by 4 pm on Wednesday 17/9.

#### **About the author**

Dr Li Wang is the Learning Services Manager at the University of Auckland Library, New Zealand. Li's current role is to work in collaboration with the Library Faculty Services teams and academic staff to implement information literacy strategies across the University; and to manage, coordinate and develop staff professional development in the areas of information literacy, information literacy education and IT literacy. Li was a Subject Librarian before her current role where she worked collaboratively with faculty to provide information literacy education to students. Li Wang can be contacted at: [l.wang@auckland.ac.nz](mailto:l.wang@auckland.ac.nz)

**This article has been cited by:**

1. Robert Farrell, William Badke. 2015. Situating information literacy in the disciplines. *Reference Services Review* 43:2, 319-340. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
2. Heidi Buchanan, Katy Kavanagh Webb, Amy Harris Houk, Catherine Tingelstad. 2015. Curriculum Mapping in Academic Libraries. *New Review of Academic Librarianship* 21, 94-111. [[CrossRef](#)]
3. Sharon A. Weiner. 2014. Who Teaches Information Literacy Competencies? Report of a Study of Faculty. *College Teaching* 62, 5-12. [[CrossRef](#)]
4. Marilia Y. Antunez, Sarah E. Toevs, Melissa A. Gains. 2013. Rejuvenating aging studies in academic libraries. *Collection Building* 33:1, 2-10. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
5. Rafael Bravo, Laura Lucia, Maria J. Martin. 2013. Assessing a web library program for information literacy learning. *Reference Services Review* 41:4, 623-638. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
6. Juris Dilevko, Lana Soglasnova. 2013. Knowledge Maps and the Work of Academic Librarians in an Interdisciplinary Environment. *The Reference Librarian* 54, 143-156. [[CrossRef](#)]