

Information Literacy Assessment: Where do we start?

Introduction

There has been interest in and concern over the lack of rigorously designed assessment of information literacy in Higher Education in recent years. Johnston and Webber (2003, p. 342) discuss the gap between “*the implied information literacy curriculum and actual practices of teaching, learning and assessment*”. Scharf et al (2007, p. 462) worry that, after the considerable body of work carried out in “*defining and characterising information literacy ... faculty, librarians and administrators need tools to evaluate the information literacy abilities of students*” and that standardised multiple-choice tests may come to predominate by default which “*may not be well-suited to the task of evaluating higher-order skills*”. Dunn (2002, p. 28) feels that “*Most often, librarians have attempted to assess student information competence skills by ‘testing’ students with standard classroom tests based on multiple choice, fill-in-the-blank, and matching questions. Such tests ... cannot assess the effectiveness of student search skills in real life situations.* Noe and Bishop (2005, p. 174) look at the sheer quantity of information literacy tutorials being developed, even though “*little direct research has been conducted on whether these information literacy programs are effective*”.

There is a large body of literature that describes case studies and examples of information literacy assessment, particularly in the United States –many of which were triggered by the ACRL information literacy competency standards (2000). The sheer quantity of examples in the literature however, can make it hard for librarians looking to use or develop an assessment tool to find examples of best practice amongst the literature, especially those that address some of the concerns expressed above. Books such as those by Neely (2006) and Avery (2003) give examples of assessment methods used as well as brief overviews, but do not give a real sense of the breadth of assessment methods being used, nor ideas as to which methods have been

shown to be reliable (that is, they are repeatable and will give similar results each time they are used) or valid (that is, concerning “*what the test measures and how well it does so*”, Anastasi (1997, p. 139)).

This article does not attempt to determine the best methods for assessing information literacy. It seeks instead to give a picture of the types of methods being used for assessment; an idea of which are popular within the field and illustrative examples from some of the case studies found, particularly where they show how the people involved have considered the reliability and validity of their methods. The article does this through a representative review of the literature on this area. Some key research currently being undertaken in the UK may not be included, even where the author may be aware of it, if it has not been published in a peer reviewed journal or picked up by these particular searches (e.g. Angela Newton’s development of an audit tool at Leeds University or the HEA ICS questionbank of Information Literacy assessment questions described in Stubbings and Franklin, 2006). This is because this article is not a traditional literature review that selects “up front” the most influential articles within an area, but seeks instead to show a representative selection of practice within information literacy assessment and to draw examples from this pool of articles that practitioners can use to develop their own tools.

It is hoped that the article will act as a “jumping off point” for librarians considering introducing assessment of information literacy into their own institutions. The author hopes to use some of the case studies found to start developing a tool for information literacy assessment within his own institution and hopes that others find these examples just as useful in designing their own.

Method

The main literature review aimed to answer one key question – “What methods are being developed and used by librarians to measure information literacy and do any of them have proven reliability and validity?”. Two initial concepts were drawn out of this question for the searches – “Information literacy” and “measurement” / “assessment”. The idea of quality as measured by the reliability and validity of the assessment tools was not included in the searches – it was addressed through the reading of the full-text of relevant articles.

As such, terms such as “information literacy” or “information skills” were used in conjunction with “assessment”; “measurement” or “evaluation” (full details of searches including limiters can be found in Appendix A) in some major, relevant databases – LISA, LISTA, ERIC and CINAHL. Formal subject headings or descriptors were identified in each database prior to the searches being carried out. These subject headings or descriptors were then used in preference to searching other fields within the databases. This meant that slightly different search terms were used in each database but articles covering the same concepts or topics will have been retrieved each time, regardless of terms used in titles or abstracts of articles. Searches were limited to peer-reviewed articles only as a basic measure of quality; formal subject headings were used where applicable as explained above and searches were not limited by date range.

The searches aimed to find studies that included details of tests that may be seen to assess aspects of information literacy in a library setting rather than purely theoretical articles, and as such the search results were filtered as follows: duplicates were removed; studies were only included if they gave sufficient details of any test instruments used to show their methods and if they could be seen as testing an aspect of information literacy. Studies were excluded if they were purely theory and only articles that outlined a case study were included.

Summary of results found

The initial results of the searches are shown in the table below:

Database	Number of results
CINAHL	34
ERIC	235
LISA	144
LISTA	167

Abstracts were examined for relevance using the criteria outlined above and duplicates (21) were then removed.

In total 127 articles were identified from their abstracts as needing further investigation. All but one of these was obtained as full text and the articles were first examined for relevance, then assigned to a category of assessment tool depending on the primary method used to assess information literacy. A small number of studies (five) were assigned to more than one category as they used different assessment methods of equal importance.

The chart below shows the categories, along with the number of relevant articles identified as belonging to the category.

Category	Number of articles	Number as a % of total
Analysis of Bibliographies	17	18.7%
Essay	6	6.6%

Final Grades	1	1.1%
Multiple Choice Questionnaire	31	34.1%
Observation	2	2.2%
Portfolio	8	8.8%
Quiz / test	14	15.4%
Self-assessment	10	11.0%
Simulation	2	2.2%
Total	91	100%

Some examples of case studies from these categories are outlined in the following section along with further information on the full meaning of each category.

Discussion of results

Many of the case studies described in the literature use a key instrument to assess learning or information literacy along with a secondary method to assess teaching, or may have a multiple choice questionnaire that includes as a minor part some questions that are not multiple choice. The results are grouped by primary method used, so many case studies described may include a secondary method as well.

Out of the nine types of assessment tool found, the most popular, used by over a third of the studies, was to use multiple choice questions, but four out of the nine account for 79% of the studies. These most popular four are discussed below and representative examples given from the studies that used them. The remaining five have brief details of each study shown and discussed.

Multiple Choice Questionnaire

This was by far the most popular method being used by over 34%. There was rarely a reason given for using this method other than hints about ease of use, speed and convenience, particularly with regard to online versions or the re-use of similar tools or question banks. For example, when Samson and Millet (2003, p.89) talk about the design of their tool they say:

“Library teaching faculty participated in their development and they meet their specific requests that it be short so as not to intrude on teaching time”

Riddle and Hartman (2000, pp.61-62) used multiple choice questions when trying to design an instrument that would not “*overburden the already limited resources and time of the library staff*”.

Multiple choice assessments display great variation in length and detail with some questionnaires containing as few as six or eight questions, (such as Samson & Millet, 2003 or Houlson, 2007), that only test specific knowledge or skills covered in a library instruction session. Others are lengthy, detailed tests (such as the 60 questions in the test used by Cameron et al., 2007 and re-used by Gross and Latham, 2007) that are often mapped carefully to information literacy standards, particularly the ACRL information literacy competency standards (ACRL, 2000).

Most studies make little attempt to check the reliability or validity of their test instruments in assessing information literacy skills, which perhaps is not surprising in that many of the shorter tests are designed primarily to check knowledge and skills gained specifically in library instruction sessions, especially as there are problems in assessing reliability in short multiple choice tests. There are a few notable exceptions to this, in particular Cameron et al (2007); O’Connor et al (2002); and Ondrusek et al (2005).

Cameron et al (2007, see table one on page 231), checked the reliability of their 60 item test using 524 students. The test showed strong reliability overall, though with slightly lower levels of reliability for the individual sections of the ACRL competency standards. They also checked construct and content validities. Content validity (does each question test the property that the designers intended?) was tested by three librarians, rating whether or not each question matched the standard that the item was intended to measure (by three categories – “matched the standard”; “uncertain”; or “Did not match the standard”). There was good inter-rater

agreement between the three librarians. Construct validity (does the whole test measure the “idea”, that is “information literacy”, that they were intending to measure) was tested in three ways, comparing data from people who took the information literacy test with another similar but older test (not following the exact same competencies) taken by all students at the institution; a second check used a group of students who rated their own use of information sources and information literacy related activities, along with confidence in finding and evaluating information. This was compared to their results in the newly developed test. Thirdly they compared the results of a new group of students with students who had already received information literacy instruction. All three of these showed evidence that the test had construct validity.

O’Connor et al used a single group of 554 students (after the initial pilots) to check the reliability of their instrument, which was carried out as an early part of project SAILS (www.projectsails.org) – which has produced a standardised information literacy site that can be licensed for use by other organisations. They used a Rasch model to check the distribution of test scores and concluded that most of their test items were reliable and “*that the items worked together to measure at least some portion of the trait of information literacy*” (p. 540).

Ondrusek et al. (2005) put their test through many different versions, with information from the results of each one being used to develop the test further and gives helpful examples of how they refined the test questions asked. They checked the latest version of their test at the time of writing (version 4) by comparing results from a large number of student test results. They calculated a reliability co-efficient of 0.7301 (on a scale of 0 to 1) from one group of 865 students and 0.7628 for a group of 1,352 students, figures they saw as being consistent and high enough to show good reliability. They provide limited evidence, however, for its validity, citing the facts that the test was “systematically reviewed by the teaching librarians”, allowed

“students to experiment as they went through the VOILA! Modules”, and that the “automated scoring scripts allow little room for human error” – which do not seem to address the key validity question – does the test measure information literacy as they have chosen to define it?

Good examples of the types of questions used can be found in some of the articles. A selection of questions used in the briefer tests can be found in Houlson, 2007; Knight, 2002; and Helmke and Matthies, 2004. Examples of questions from longer tests include Burkhardt, 2007; Noe and Bishop, 2005; and Ondrusek, 2005.

In summary, there is a real mix in the way librarians are using multiple choice questions to assess information literacy. Even though it is a method often chosen for convenience, some groups have put a great deal of effort into producing tools which map question areas onto established information literacy competencies and for which they have tried to establish reliability and validity. The use of multiple choice questions allow for easy testing and assessment using web-based tests, but it is obvious from the literature that producing a good quality test with this method is far from easy.

Analysis of Bibliographies

This the second most popular method with almost 19% using it, just over half the number that used a test based on Multiple Choice questions. These studies used the quality of student bibliographies produced (as the primary method of assessment) as a proxy for skills that cover key parts of the information literacy whole. Bibliographies were not normally produced specifically for the assessment, but were for existing separate assignments that were re-used and re-analysed for the purposes of assessing information literacy. As may be expected by the variation in quality and usage of the multiple choice questions to test information skills, there

is also a significant variation in the quality and approach used with the case studies outlined in this section.

Compared to online multiple choice tests which can be marked automatically, results shown, and overall results analysed, examining student bibliographies is a much more subjective and time consuming method to use. Again, like the use of multiple choice tests, it tends to be used to check if library instruction is having an impact on students' information literacy and the case studies largely look specifically at skills taught by librarians in classes, with limited numbers mapping directly to information literacy as defined by competency standards such as the ACRL information literacy competency standards (ACRL, 2000).

There is limited discussion of reliability and validity in these articles, despite the fact that all the case studies use some sort of set marking scheme or rubric set in advance of the analysis. Ackerson and Young (1995), briefly acknowledge this and discuss checking inter-rater agreement on scores to establish reliability. Green and Bowser (2006) go one step further from this and attempt to ensure reliability by training raters and then comparing the marks given by new and "expert" raters with sample pieces of work to ensure good inter-rater reliability. Disappointingly, a study by Flashpohler (2003) which used an existing multiple choice test (plus students self-reporting of use of resources) as one test tool and the assessment of bibliographies as another tool, did not compare the results from the two assessment tools. This would have been an opportunity to check the validity of each test to assess information literacy.

Ackerson and Young (1995) show in outline the sort of criteria used in evaluation of bibliographies for a small group of other studies. They themselves used a very brief rating sheet marking each citation by type (conference proceeding, interview, journal, monograph or

standard) and quality (inadequate, marginally adequate, adequate or superior). This is fairly typical of some of the more basic type of analyses of bibliographies, with Hovde (2000), for example, looking at just type of citation (Books, journals, newspapers, electronic sources or other) and the assumed source of the reference (library databases, print indexes etc.).

Other studies such as Robinson and Schlegl (2004) are more objective with the assessment of quality, in this case using a detailed checklist for assessing the quality of web based sources. Some of the case studies that look into the assessment rubrics in more detail (such as Knight, 2006 or Emmons and Martin, 2002) also map the competencies they test onto the ACRL standards for information literacy (Association of College and Research Libraries, 2000). Emmons and Martin (2002) show their rubric in great detail.

Some of the studies show how the quality of bibliographies can be a good proxy for information literacy and that they are best assessed for this purpose with detailed rubrics. There is limited discussion as to how this can be used to show information literacy as a whole, for example by using the ACRL standards, but this could easily be expanded on with discussion of the validity of tests. There is limited discussion of the reliability of these tests and it seems that the easiest method of checking reliability which is discussed in two of the articles (using more than one rater and checking the match between two ratings of the same bibliography) is little used.

Quiz/Test

These studies (over 15% of the whole) test information literacy skills via a quiz or test which does not rely primarily on multiple choice questions. They are often very similar to some of the

multiple choice question based tests and often have an assortment of multiple choice and short answer type questions.

Some, such as Colborn and Cordell (1998) and Currie et al (1982), who give examples of their test instruments, could easily be re-worded to form multiple choice questions only. Many examples of this type, however, are where a decision has been made that purely multiple choice assessment is too limited and the test designers wish to use items such as “*interactive, problem-based exercises that measure procedural knowledge*” (Ivanitskaya, 2006).

Some of the case studies map the questions on to specific information literacy competencies using the ACRL standards (ACRL, 2000), but there is limited discussion as to the reliability or validity of the tests. The articles describing the Research Readiness Self-Assessment (RRSA) tool (Ivanitskaya, 2006 and Ivanitskaya, Laus and Marie Casey, 2004) discuss in detail the reliability and validity of the test instrument. Methods such as checking with other librarians that the questions map to the standards chosen (ACRL), and that individuals with greater perceived information literacy (doctoral level students) scored consistently higher than individuals with lower perceived information literacy (undergraduate students) were used to check content and face validity. Reliability was checked by comparing the consistency of answers within the test for each student.

Some examples of the sort of questions used in this type of test can be found in Fiegen et al (2002) and Emmett and Emde (2007), both of which used the ACRL standards (Association of College and Research Libraries, 2000) as a guide.

Self-assessment

This was a popular way of looking at information literacy and related skills, with many of the studies using self-assessment forms as a secondary, subjective method of assessing skills to compare with other more objective tools. In this review, 11% of case studies used it as their primary or only method of assessment.

Studies that compare self-assessment with other methods flag up problems with the method with Maughan (2001) finding that “*students think they know more about accessing information and conducting library research than they are able to demonstrate when put to the test*” and Tierney’s (1992) two test instruments showing “*conflicting sets of results*”. This did not stop Kurbanoglu et al (2006), however, trying to develop a self-efficacy scale for information literacy, which was the only article that tried to show reliability and validity of a self-assessment test instrument for information literacy – this article also includes the full test and final versions of the instrument.

Although many test instruments include an element of self-assessment, it can be seen that there are dangers in using it as an assessment tool which must be borne in mind when designing the tool.

Portfolio

Just under 9% of the case studies used this as the primary assessment tool. Studies were classed in this category if a portfolio of evidence was put together and used for the assessment of information skills or information literacy.

A much more time consuming and intrusive method than the alternative methods listed above, it is not surprising that six of the eight case studies that used portfolios, did so to assess a

taught module specifically addressing information literacy (or related literacies such as media literacy). Buchanan et al (2002); Fourie and Niekerk (1999 and 2001); Sharma (2007); Machet (2005); Sonley et al. (2007); and Muiherrin et al (2004) all described the development of information literacy modules at higher education institutions and the testing of the outcomes of that module using portfolios. There is considerable discussion of the benefits and drawbacks of portfolio assessment within the articles found, but as the majority of articles looked at assessing a taught module, there was little discussion as to how well they assessed information literacy per se and how reliable or valid the tools were in that respect.

Two articles were not concerned with a taught module in information literacy. Scharf et al (2007) described the use of portfolios to assess the information literacy of students in order to improve the teaching of these skills. They used samples drawn from the writing portfolios produced for assessment for humanities undergraduates and assessed them using a set of criteria including “Citation”; “Evidence of Independent research”; “Appropriateness”; “Integration”; and “Overall information literacy portfolio score”. These are covered in full in their article. They address reliability and validity issues in detail, checking for inter-rater reliability, the internal consistency of the model (comparing scores on first four sections with the “overall information literacy portfolio score”), and looking at the relationship between the test score and scores on SAT test and the students’ final course grades. Warner (2003) used portfolios of work to attempt to improve teaching methods. In this case students used an online journal to create a portfolio showing how they went about research for other assignments. There was little discussion of the reliability and validity of this method to assess information literacy.

Though portfolios seem to have been used most often to assess the outcomes required of a taught module, rather than assessing information skills per se, Scharf et al (2007) stands out in

attempting to produce a reliable and valid tool to assess information literacy and this tool may be worth considering to assess the information literacy of small numbers of students. Its time consuming nature, however, means it is difficult to use with large numbers of students.

Essay

Six studies (6.6%) used essays: that is the setting of essays, or analysis of essays set for other purposes, as their key method of assessment. This section does not include case studies where the focus on analysing essays is the bibliography only. Half of the six studies reported on assessment directly tied in with modules or courses that have a high element of information literacy instruction, which may perhaps be expected with a tool that is more time consuming and qualitative than many of the others described here.

Daugherty and Carter (1997, p.30) used a small sample (49 students) to look at effectiveness of library instruction and set essays to answer the question “*Clearly list all the steps you would go through in order to perform the following task: Obtain an article published in a psychology journal concerning the relationship between stress and health*”. The essays were marked using a standard rating system agreed beforehand.

Dykeman and King (1983), analysed existing essays in much the same way as many case studies classed here as analysis of bibliographies. In this case they also looked at wider skills by analysing the paper as a whole, using a set scoring guide.

D’Angelo (2001) gives a full example of a rubric used to mark student essays used for an Adult Career Development course that included information skills teaching. This was combined with

pre- and post- teaching questionnaires which asked about students' information seeking behaviours.

Nutefall (2005, p.93) used a reflective essay format by students to assess information literacy after an "Oral communication and information literacy" course. They described it as the "Paper Trail" assignment and required students to:

"In conjunction with the completion of each student's informative speech, they will argue for the merit of the research process that led them to create their speeches in this two-to-four page essay. The paper trail should allow the librarian and the communication professor to trace all of a student's research."

Fuller details of student guidance for creating this reflective essay can be found in Nutefall's article.

Halttunen and Järvelin (2005, p.951) look at assessment of outcomes by concept mapping of student essays in a larger research project based on students studying a course in Information Retrieval. This assessment was designed to provide *"feedback and motivation to participants and it is used in the evaluation of the design experiment"*, not to assess information skills as such, but show how concept maps can be used to see *"the big picture"* which may be useful when assessing information literacy qualitatively.

The only article in this section that directly tries to map an assessment onto information literacy competencies standards was by Choinski et al (2003). This article shows the initial development of a marking rubric mapped onto the ACRL information literacy competency standards (Association of College and Research Libraries, 2000) which was used specifically for assessing an Information Resources class. None of these studies address explicitly the reliability and validity of their test instruments, which is reasonable bearing in mind both the

qualitative leanings of this method and the emphasis on assessing set modules and taught skills rather than information literacy as a whole.

Observation

Two studies used observation as a key method of assessment.

Novotny and Cahoy (2006) looked at a very particular area, the use of an online library catalogue and concentrated on the impact of instruction on the search strategies used. A small sample group of students were asked to verbalise their conscious thoughts as they searched the catalogue. This is a small, very specific study that may not be directly transferable to wider information literacy assessment, but may give pointers on where to start if using observation to assess such skills.

Dunn (2002, p.31) describes the use of observation as one tool used in a large project to assess information literacy skills. Tools such as a quiz were also used. Observation was used to try to capture:

“How do students approach and complete information tasks within a set time period using computer and library resources? How are the strategies and resources students use related to the products of their work? What pedagogical issues might emerge from an analysis of observed information literacy behaviours? What similarities and differences exist amongst faculty, librarians, and students in their conceptualisation of information-seeking strategies?”

They captured behaviour using screen capture software (64 students) and ethnographic field notes (from researchers shadowing 16 students as they worked on assigned tasks)

While probably not suitable for mass assessment of information literacy, the observation case studies show more in depth, qualitative data on search skills than can be easily captured by most of the other methods shown. It potentially shows the actual information seeking behaviour in preference to tested knowledge that may never be used. There is a danger, however, that the people being observed try to carry out the information seeking tasks the perceived “correct” way rather than the way they would normally, so care must still be taken over the interpretation of results from this method, as with any other method described here.

Simulation

Two studies (2.2%) used simulations as their key method of assessment. Along with observation, this method has the potential to dig deeper into actual behaviour rather than theoretical (and potentially never applied) knowledge.

Roberts (2004, p.213) used a pencil and paper simulation exercise to examine the information seeking skills of some (253) student nurses. Content validity was checked by using a small group of experts who looked at the simulation task before the initial pilot. The study participants “*were each given a blank A4 sheet of paper entitled ‘Information Sheet’ and requested to document the data, including the rationale; which they would require prior to planning the patient’s care in practice*”. Roberts discusses further improvements that could be made to improve validity and reliability of the assessment tool used.

Newell (2004) describes the development and use of a computer based assessment tool called Virtual Reality Information Literacy and Assessment Space (VILLAS). A detailed study was carried out into the existing practice of information literacy assessment within one institution,

using ethnographic research methods (including observation, interviews and document analysis). This informed the design and development of a virtual learning and assessment space called VILLAS. This is a virtual environment in which students were set tasks (such as searching for material on particular topics) and rated on how objectives were met within this virtual environment. It is not clear in this article whether VILLAS was ever actually used, or is still in development.

The two case studies covering simulations show the potential of this method in getting to the heart of information literacy – how people seek out and use information in response to a real problem. It is not clear, however, whether this is a sufficiently practical method to be used widely.

Final Grades

Just one study looked in detail at final student grades. Samson and Granath (2004) used a mixture of multiple choice questionnaires, an analysis of bibliographies, and students' final grades. It is not clear from their article whether the different tools show consistent results and show support for the validity of each tool. It would have been interesting to see any evidence that final grades are linked to information literacy.

Conclusion

Although most of the case studies used tools to assess student learning after specific courses or instruction by librarians, it can be seen that a range of methods are being used to assess information skills or information literacy as a whole. Considering the large number of relevant articles found (91 in this review), relatively few indicate how the reliability and validity of their instruments have been checked, with Cameron et al (2007); O'Connor et al (2002); Ondrusek et al (2005); Ivanitskaya (2006); Ivanitskaya, Laus and Marie Casey (2004); Kurbanoglu (2006); Scharf et al (2007); Roberts (2004); and Newell (2004) being the key exceptions.

These examples of good practice in showing reliability and validity cover several types of assessment tool (multiple choice questionnaires, quiz / tests, portfolio and simulations), showing that an argument can be made for various types of assessment tool reliably showing levels of information literacy. They also, in particular the many case studies that helpfully list their sample questions, outlines and marking rubrics, should help those considering introducing information literacy assessment tools to develop their own reliable and valid tests based on best practice elsewhere.

When deciding to design assessments tools for information literacy we must decide how to balance our needs for a test that is easy to administer with one that will truly assess the varied transferable information skills that information literacy implies. Portfolios (Scharf et al, 2007) and simulations (both Roberts, 2004 and Newell, 2004) have been shown to be valid and reliable tests of information literacy, including the higher order skills that are so difficult to test. Multiple choice questionnaires, particularly online versions, have the advantage of being quick and easy to administer to large numbers of students but can often concentrate on the

easier, lower level skills that suit such tests. The best multiple choice based tests developed, take care to address concerns about the testing of higher level and transferable skills such as those raised by Dunn (2002, p.28) who argues that “*such tests ... cannot assess the effectiveness of student search skills in real life situations*”. The best of these tests, including Cameron et al (2007); O’Connor et al (2002); and Ondrusek et al (2005), address at length issues of reliability and validity and show us useful pointers towards designing such tests that also address, (to some extent), the higher level skills. The best of these are also honest enough to recognise that their weakest areas are those that attempt to test higher level skills.

When the requirement is to assess the information literacy of small numbers of students, particularly as part of a taught module where there is regular and sustained contact with a student cohort, it can be seen that the use of portfolios may a useful way of assessing the information literacy of that group of students, with Scharf et al, 2007 giving detailed and useful information to help others design such a tool. Where time, particularly contact time with students, is limited, then online audits making heavy use of multiple choice type questions can give us a useful measurement of the information literacy of students, though it is likely to be difficult to measure higher order skills in this way. Cameron et al (2007); O’Connor et al (2002); and Ondrusek et al are all good starting points for anyone designing such a tool.

It must also be emphasised again that this is far from an exhaustive list of assessment case studies and tools. It aims merely to be a representative sample of those information literacy assessment techniques found by the strictly controlled search (described in Appendix A) which should give readers an idea of the range of techniques, their relative popularity, and an idea of best practice within the categories identified.

Bibliography

Ackerson, L. Young, V. (1995) *Evaluation of student research paper bibliographies: refining evaluation criteria*. *Research Strategies*, 13(2), pp. 80-93

Anastasi, A. (1997) *Psychological testing*, 7th Ed. New York: Macmillan Publishing.

Association of College and Research Libraries (2000) *Information Literacy Competency Standards for Higher Education*. ACRL, Chicago.

Avery, E. (2003) *Assessing student learning outcomes for information literacy instruction in academic institutions*. Chicago : Association of College and Research Libraries

Buchanan, L. Luck, D. Jones, T. (2002) *Integrating information literacy into the virtual university: A course model*. *Library Trends*, 51(2), pp..144-167

Burkhardt, J. (2007) *Assessing library skills: A first step to information literacy*. *Portal: Libraries and the academy*, 7(1), pp. 25-49

Cameron, L. Wise, S. Lottridge, S. (2007) *The development and validation of the information literacy test*. *College and Research Libraries*, 68(3) pp. 229-236

Choinski, E. Mark, A. Murphey, M. (2003) *Assessment with rubrics: An efficient and objective means of assessing student outcomes in an information resources class*. *Portal: Libraries and the Academy*, 3(4), pp. 563-575

Colborn N. Cordell R. (1998) *Moving from Subjective to Objective Assessments of Your Instruction Program*. *Reference Services Review*, 26(3-4), pp. 125-137

Currie, M. Goettler, E. McCaskill, S. (1982) *Evaluating the Relationship Between Library Skills and Library Instruction*. Canadian Library Journal, 39(1), pp. 35-37

D' Angelo, B. (2001) *Integrating and assessing information competencies in a gateway course*. Reference Services Review, 29(4), pp. 282-293

Daugherty, T. Carter, E. (1997) *Assessment of outcome-focussed library instruction in psychology*. Journal of Instructional Psychology, 24(1), pp. 29-33

Dunn, K. (2002) *Assessing information literacy skills in the California State University: A progress report*. Journal of Academic Librarianship, 28(1/2), pp. 26-35

Dykeman, A. King, B. (1983) *Term paper analysis: A proposal for evaluating bibliographic instruction*. Research Strategies, 1(1), pp. 14-21

Emmett, A. Emde, J. (2007) *Assessing information literacy skills using the ACRL standards as a guide*. Reference Services Review, 35(2), pp. 210-229

Emmons, M. Martin, W. (2002) *Engaging conversation: Evaluating the contribution of library instruction to the quality of student research*. College and Research Libraries, 63(6), pp. 545-560

Fiegen, A. Cherry, B. Watson, K. (2002) *Reflections on collaboration: learning outcomes and information literacy assessment in the business curriculum*. Reference Services Review, 30(4), pp. 307-318

Flashpohler, M. (2003) *Information literacy program assessment; one small college takes the big plunge*. Reference Services Review, 31(2), pp. 129-140

Fourie, I. Niekerk, D. (2001) *Follow-up on the use of portfolio assessment for a module in research information skills: an analysis of its value*. Education for Information, 19(2) pp.107-126

Fourie, I. Niekerk, D. (1999) *Using portfolio assessment in a module in research information skills*. Education for Information, 17(4), pp. 333-352

Green, R. Bowser, M. (2006) *Observations from the field: sharing a literature review rubric*. Journal of Library Administration, 45(1/2) pp.185-202

Gross, M. Latham, D. (2007) *Attaining information literacy: An investigation of the relationship between skill level, self-estimates of skill, and library anxiety*. Library & Information Science Research, 29(3), pp. 332-353.

Halttunen, K. Järvelin, K. (2005) *Assessing learning outcomes in two information retrieval environments*. Information Processing and Management, 41(4), pp. 949-972

Helmke, J. Matthies, B (2004) *Assessing freshman library skills and attitude before program development: One library's experience*. College and Undergraduate Libraries, 11(2), pp. 29-49

Houlson, V. (2007) *Getting results from one-shot instruction: A workshop for first year students*. College and Undergraduate Libraries, 14(1) pp.89-108

Hovde, K. (2000) *Check the citation: library instruction and the student paper bibliographies*. Research Strategies, 17(1) pp. 3-9

Ivanitskaya, L. (2006) *Health information literacy and competencies of information age students; Results from the interactive online Research Readiness Self-Assessment (RRSA)*. Journal of Medical Internet research, 8(2), pp. 2-12

Ivanitskaya, L. Laus, R. Marie Casey, A. (2004) *Research readiness Self-Assessment: Assessing students' research skills and attitudes*. Journal of Library Administration, 41(1/2), pp. 167-183

Johnston, B. Webber, S. (2003) *Information literacy in higher education: a review and case study*. Studies in Higher Education, 28 (3), pp. 335-352

Knight, L. (2006) *Using rubrics to assess information literacy*. Reference Services Review, 34(1), pp. 43-55

Knight, L. (2002) *The role of assessment in library user education*. Reference Services Review, 30(1), pp. 15-24

Kurbanoglu, S. Akkoyunlu, B. Umay, A. (2006) *Developing the information literacy self-efficacy scale*. Journal of Documentation, 62(6), pp. 730-743

Machet, M. (2005) *An evaluation of information literacy courses offered at a distance education university*. Mousaion, 23(2) pp. 180-195

Maughan, P. (2001) *Assessing information literacy among undergraduate: A discussion of the literature and the University of California-Berkley Assessment Experience*. College and Research Libraries, 62(1) pp. 71-85

Muiherrin, E. Kelly, K. Fishman, D. Orr, G. (2004) *Information literacy and the distant student: One university's experience developing, delivering, and maintaining an online required information literacy course*. Internet Reference Services Quarterly, 9(1/2), pp. 21-36

Neeley, T. (2006) *Information literacy assessment : standards-based tools and assignments*. Chicago : American Library Association

Newell, T. (2004) *Thinking beyond the disjunctive opposition of information literacy assessment in theory and practice*. *School Library Media Research*, vol. 7.

Noe, N. Bishop, B. (2005) *Assessing Auburn University library's Tiger Information Literacy Tutorial (TILT)*. *Reference Services Review*, 33(2), pp. 173-187

Novotny, E. Cahoy, E. (2006) *If we teach, do they learn? The impact of instruction on online catalog search strategies*. *Portal: Libraries and the Academy*, 6(2), pp. 155-167

Nutefall, J. (2005) *Paper trail: One method of information literacy assessment*. *Research Strategies*, 20(1/2), pp. 89-98

O'Connor, L. Radcliff, C. Gedeon, J. (2002) *Applying systems design and item response theory to the problem of measuring information literacy skills*. *College and Research Libraries*, 63(6), pp. 528-543

Ondrusek, A. Dent, V. Bonadie-Joseph, I. Williams, C. (2005) *A longitudinal study of the development and evaluation of an information literacy test*. *Reference Services Review*, 33(4), pp. 388-417

Riddle, J. Hartman, K. (2000) *But are they learning anything? Designing an instrument of first year library instruction*. *College and Undergraduate Libraries*, 7(2), pp. 59-69

Roberts, J. (2004) *Senior student nurses information seeking skills: a comparative study*. *Nurse Education Today*, 24(3), pp. 211-218

Robinson, A. Schlegl, K. (2004) *Student bibliographies improve when professors provide enforceable guidelines for citations*. Portal: libraries and the academy, 4(2), pp. 275-290

Samson, S. Granath, K. (2004) *Reading, writing and research: Added value to university first-year experience programs*. Reference Services Review, 32(2), pp. 149-156

Samson, S. Millett, M. (2003) *The learning environment; First-year students, teaching assistants, and information literacy*. Research Strategies, 19(2), pp. 84-98

Scharf, D. Elliot, N. Huey, H. Briller, V. Joshi, K. (2007) *Direct assessment of information literacy using writing portfolios*. Journal of Academic Librarianship, 33(4) pp. 462-478

Sharma, S. (2007) *From chaos to clarity: using the research portfolio to teach and assess information literacy skills*. Journal of Academic Librarianship, 33(1) pp.127-135

Sonley, V. Turner, D. Myer, S. Cotton, Y. (2007) *Information literacy assessment by portfolio: A case study* Reference Services Review, 35(1), pp. 41-70

Stubbings, R. Franklin, G. (2006) *Overview of the HE Academy Development Fund Project : Critical evaluation of information literacy questions used to support the Department of Politics, International Relations & European Studies (PIRES)*. Available at:

<http://www.ics.heacademy.ac.uk/projects/development-fund/final_reports/65ov_rstubbingsoverview.pdf> [accessed 21st May 2008].

Tierney, J. (1992) *Information literacy and a college library: A continuing experiment*. New Directions for Higher Education, 20(2), pp. 63-71

Warner, D. (2003) *Programmatic assessment: Turning process into practice by teaching for learning*.
Journal of Academic Librarianship, 29(3), pp. 169-176

Appendix A

CINAHL –

Searched 6th December 2007, 34 results

Search terms – using CINAHL Headings, “Information Literacy” OR “Information Seeking Behaviour” with subheadings of “evaluation”. Limited by peer-reviewed only.

(MH "Information Literacy"/ev) or (MH "Information Seeking Behavior/EV")

ERIC –

Searched 6th December 2007, 235 results

Search terms – Using ERIC headings (Descriptors), “Evaluation” AND (“Information literacy” or “library instruction” or “information skills” or “library skills”) AND Journal articles only

“No. 6, Database ERIC - 1966 to date; Search term: "Evaluation#.W..DE." (Info added since: unrestricted, Results 149905)

No. 8, Database ERIC - 1966 to date; Search term: "INFORMATION-LITERACY#.DE. OR LIBRARY-INSTRUCTION#.DE. OR INFORMATION-SKILLS#.DE. OR LIBRARY-SKILLS#.DE." (Info added since: unrestricted, Results 4627)

No. 11, Database ERIC - 1966 to date; Search term: "PT=JOURNAL-ART\$" (Info added since: unrestricted, Results 556875)

No. 12, Database ERIC - 1966 to date; Search term: "6 AND 8 AND 11" (Info added since: unrestricted, Results 236)

No. 14, Database ERIC - 1966 to date; Search term: "unique records from 12" (Info added since: unrestricted, Results 235)

LISA

Searched 16th November 2006, 144

Search terms – Using LISA headings (Descriptors), (“Information literacy” OR “user training”) AND (assessment OR evaluation OR measurement) limited to peer reviewed only

DE=((information literacy) or (user training)) and (assessment or evaluation or measurement)

LISTA

Searched 15th November 2006, 167 results

Search terms – Using LISTA Subject terms “information literacy” and (assessment or measurement or evaluation) and limited to peer reviewed only

Subject term=”information literacy” and (assessment or measurement or evaluation)