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TAKING SNAPSHOTS OF HIGHER EDUCATION INSTRUMENTS FOR ASSESSMENTS OF HIGH LEVEL INFORMATION COMPETENCE

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Abstract

This paper attempts to take snapshots of the numerous information literacy assessment procedures for higher education using the lens (through selected evaluation criteria) through which many different teaching and learning assessment approaches with their composite cognitive activities unfold. In the process, we recognized that the lens itself shape how we interpret the salient aspects and diverse construct of information literacy and the conceptions, as well as pedagogical approach of information literacy for higher education in the context of a technological environment. While looking closely at these assessment procedures, it becomes clear to us that helping students achieve high information competence cannot be accomplished in one setting. Information literacy must be integrated throughout academic career, because the skills that revolve around information literacy have become the critical skills of today's society. This study is still in its infancy, and in this paper we present the preliminary evaluation of the different types of information literacy assessment procedures offered for higher education. There are certain aspects that need to be scrutinized such as reliability and validity and other psychometric and statistical concepts, and how these aspects were achieved in some instruments. However, through the assessment reviews, various measurement approaches have indicated interactive tutorials and quiz modules are not, by their very nature, easily validated by standardization procedures. Some are more complicated to administer - with complex set of variations, yet they are clearly aimed to analyze and evaluate the magnitude of learning competence to predict future performance in the academia and corporate settings. There is no assessment that fits for all population and no single formula that allows one to match the perfect delivery method to particular circumstances. Each assessment methodology has its weaknesses and strengths. However, the guiding principle should always be to choose the most appropriate assessment method available to measure the desired learning outcome. Significantly, the realization that information literacy exists as an integral part of students' basic learning assessment is now widespread globally. Information competence is vital to university's students' academic achievements and professional success and it will contribute to their lifelong learning. This paper is undertaken towards development or adaptation of such a quantifiable assessment tool for measuring the level of information literacy among students of higher education.

Keywords: Information literacy assessment; Information literacy evaluation; Higher education; Research skills; ICT literacy; Information competence

INTRODUCTION

When asked, why the need to assess information literacy (IL) for higher education, the answers lie in global conditions – striking social changes are taking place characterizing the general environment as information-intensive society. Because of the escalating complexity of this environment, individuals are faced with overflowing of diverse information sources - and increasingly, information comes to individuals in unfiltered formats, raising questions about its authenticity, validity, and reliability (ACRL 2001).

Moreover, the sheer abundance of information will not in itself create a more information literate student without a complementary cluster of abilities necessary to use information effectively. The more information there is from a multitude of sources, the more important it is to be critical about it. However, the current survey of the British Library reveals the IL of today's learners, has not improved with the widening access to technology; in fact, their apparent facility with computers disguises some worrying problems (The British Library & JSIC, Feb. 2008). It is as if the Internet, in making information accessible and convenient, has paradoxically led to a decrease in the critical thinking skills needed to deal with information. Brevik (2005) opined that this trend is really troubling as these skills have become more central in academic, corporate and everyday life. Thus, the cost of not being able to find and process information effectively via technology are real barriers in academia, workplace and society.

With these conditions, higher education institutions are continuously tasked to be accountable for quality teaching and learning practices which are considered to be of highest priority. They are called upon to clearly define their roles in training and credentialing that their graduates have the knowledge and skills expected in the workplace (Higher Learning Commission 2003). Much of these are being done under the guise of accountability through programs' assessment strategies of students' learning outcomes. They developed evaluative instruments and systems that would demonstrate students' efficacy of their knowledge with the tools that enable them to grapple with the challenges and nature of inquiry itself. For this concern, assessment is the answer and IL is a part of students' learning assessment (The Information Literacy Meeting of Experts 2003). Although there has always been widespread suspicion, if not outright dislike for assessment and its practices, they appear to be a permanent feature of the educational environment. Some universities and colleges identified "information literacy" as a critical outcome of higher education. To this extent, IL has been incorporated in accreditation standards and assessment is done at course or program level. With these developments, it is imperative that assessment should reflect the purist measure of student learning achievement possible. How to prepare a person for life in information society and society of knowledge? Necessity of special information training or development of IL was evidenced in the papers in the World Information Summit in Geneva, 2003 that could be used to create and advance a more interactive course that includes opportunities for social interaction and learning (Gendina 2008).

This paper is geared towards development or adaptation of such a quantifiable assessment tool for measuring the level of IL among students of higher education. In the process, key learning attributes will be focused for purposes of assessment in IL curriculum formation or reform. Its goal will be twofold. First is to identify established online assessment procedures and learning/quiz modules of information literacy for higher education and to develop a valid and reliable content analysis using internationally recognized competency standards as benchmark. Second is to develop or use and modify suitable method for a quantifiable assessment tool that will confirm the analyses of the content analysis of accessible online IL assessment strategies for higher education. Further investigation will present a compilation of information about sampling of the numerous developed instruments that have been cited as assessing information literacy competencies for higher education. Information about content, scoring, reliability, validity and method design comprised the sampling presentation of assessment strategies.

PRELIMINARY SURVEY OF RELATED LITERATURE

Development of research Skills: The high end of information literacy

Research and knowledge production are the competitive weapons of higher education institutions and the standing of universities is measured by the creation and refinement of knowledge. To that extent, they are seen as their primary responsibility and irreplaceable function that has always been the exploration and production of knowledge (Leveille 2006). Research is a valued dimension of universities and IL is essential to achieve the university's goal to graduate well rounded individuals capable of critical and independent thinking. Therefore, it is imperative that students should be given a dimension of experience and capability they cannot get in any setting, a research experience that is unfeigned, individually meaningful and life-long. Most educators agree that teaching IL as a process is the best approach to addressing the essential knowledge and research skills needed towards working effectively with information. On this account, higher education is faced with a need to provide formal instruction in IL and technological literacy as well as in how to create meaningful content with today's tools.

The development of research skills which is crucial to university's goal is actually the high end of IL but it has often individual and societal attribution because it deals with critical thoughts and communication. Assessing the students' academic experience and their ability to perform poses great challenges to the academe (Kapoun 2004). For all these challenges, assessing IL in higher education can no longer be ignored if they want to prepare their students on the way to being responsible researchers and mature scholars, articulate and adept in the techniques and methods of their chosen fields, ready for the challenges of a professional life. Recent studies posited IL instruction requires a shift in focus from teaching specific information resources to a set of critical thinking, problem solving and research skills. This involves the critical use of information to communicate an academic research process that is relevant to students' expectations. Students gain rich learning experience if they are involved in research that leads to new discoveries and practical outcomes. It is largely through their research performance, and how this is carried through to excite and motivate to sustain the learning process and inform them the benefits flowing from research. It is the responsibility of higher education institutions to produce deeper, broader and more reliable knowledge than is possible through effective assessment strategy for measuring students' information literacy enhanced by sophisticated tools (Corrall 2007). This includes facilitating the use of digital technology, communication tools and/or networks to solve information problems in order to function in an information intensive society. Furthermore, to enhance the ability to use technology as a tool to research, organize, and communicate information and having a fundamental understanding of the ethical / legal issues surrounding accessing and using information. Today's society needs citizens who not only know how to acquire information, but who can also analyze and evaluate what they learn in order to develop an informed opinion.

Quantitative assessment of information literacy: Implications for higher education

Learning expectations of higher education in the 21st century are enormous. Society still regards higher education as a major instrument for improving quality of life and for preserving the essential features of the kind of society it wants to have it merits. Wherefore, the implication of IL competency for higher education is that students are charged to continue learning themselves and for universities to build strong assessment programs that provide meaningful information about whether students are mastering important skills and outcomes.

Inherent in the mission of higher education institutions is the development of lifelong learners, who continue to learn beyond formal academic education. Thus, the ability to effectively retrieve and use information critically becomes the pivotal concerns of our times (Woolf 2004). This has led to assess students' learning and determine how well performance matches expectations and standards. A substantial body of research demonstrates the development of various assessment strategies of students' achievement in higher education but struggle on how to model and/or remodel and discern whether the assessment strategy is effective. Hence, the deeper issue is a purely quantitative assessment - becomes the determining factor of what is learned and how it is learned. On that ground quantitative assessment information literacy is essential for an objective understanding / judging the strengths or weaknesses of learning among university students. They can be high on reliability and validity and they can allow for national norming and benchmark comparisons.

However, assessment is a more comprehensive term referring to the entire process of compiling information about a student learning process and outcomes and using it to make inferences about the magnitude of learning competence to predict future performance and behavior. In sum, assessment of student IL performance and outcomes involves other approaches such as observations, interviews, IL rating scales and checklists, IL skills inventories, projective and IL achievement tests.

Assessment maybe required by a variety of interest parties for a number of different reasons. In this paper, it is categorized as IL performance assessment to investigate students' learning competence and to identify areas that require greater instructional attention. This will lead to evaluate the effectiveness of the IL assessment/learning module offered by the higher education institutions and the level of awareness of the student population about the course program. In the long run, this involves making our expectations explicit and focusing our collaborative attention by setting appropriate criteria and high standards for higher IL learning quality. By that means, providing different assessment models and learning modules where practitioners can use for benchmarks for comparison with designing their own course and assessment programs.

AREA OF CONCERN

For many reasons, assessment of students' learning IL is often defined as measuring what is learned and how it is learned over what is taught and how it is taught (Brown 2001). Therefore, the basic assumption of its structure should be aligned with teaching and learning objectives for effective assessment and to further influence student learning more than any other factor in the IL curriculum. This is especially true when confronted with issues of how to make IL assessment accurate and fair. We are embarking on a study that will bring into focus and find answers to the following questions:

1. What assessment approaches are higher education institutions taking to be certain that all students are information literate?
2. How can students' information literacy competence be assessed effectively; can the assessment of the categories provide a potentially useful tool for IL practitioners?
3. Why are selected methods of assessment employed; how do such indices revealed desired evidence of students' information literacy?

4. How reliable and valid are the standardized assessment procedures; are there specific characteristics / variables related to current assessment approaches?
5. What are the criteria used to determine if an assessment instrument is good to measure information literacy for higher education?

OBJECTIVES OF THE STUDY

It is apparent that the results of assessment may have far reaching implications for the future of the individual student being assessed. As Cheuk (2002) and Drucker (1998) emphasized, "In today's organizations you have to take responsibility for information because it is your main tool. But you must know to how to use it effectively. Only few are information literate despite familiarity with today's powerful tools". Becoming information literate in the academic and corporate settings and everyday life requires critical experience with social and technological, multi-modalities as well as textual information. One uses IT to access and retrieve information and possesses basic research skills and knows how and when to use and communicate them (Breivik 2005). And those who can communicate effectively in the context of technology have clear academic and professional advantage. Today's success is measured how well one can evaluate, manage and communicate all forms of information within a technological environment.

A clear definition of the exact goals of the assessment procedure is therefore important to ensure that the information gained will be relevant, complete and accurate. This study is undertaken to meet the following objectives:

1. To identify the many types of assessment strategies currently used to assess information literacy for higher education.
2. To explore the benefit of assessing information literacy and the teaching process that reflects sound pedagogical practice.
3. To provide models of assessment approaches on the aspects of information literacy program that practitioners can use for benchmarks for comparison with designing their own course and assessment programs.
4. To examine and determine defining characteristics related to currently used assessment strategies, such as validity and reliability, and other defining characteristics of the instrument.
5. To develop or adapt and modify quantifiable assessment tool that reflect the desired outcomes of preparing students for their academic pursuits and for effective lifelong learning

SIGNIFICANCE OF THE STUDY

The findings will provide a valuable new perspective to previous analyses and assessments of IL competencies for higher education. The development of benchmarks and the selection of appropriate method to assess IL for higher education is the initial phase of the study. In this context, this evaluation presents the assessment reviews of various assessment procedures for measuring IL skills among higher education students. It will provide much insight into the range of validating that students are developing the necessary IL skills that support the broader educational outcomes. The results of the study will provide an invaluable mechanism for reflection on the course content, curriculum development and improvement of the IL program. Subsequently, it facilitates to design/select assessment tools that measure the achievement of IL skills and other

new concerns of higher education in a way that engrossment to technology competence would not.

In addition, assessment reviews of various universities' tutorial and quiz modules, and assessment procedures will lead to the enrichment in the delivery of IL instructions in higher education. Accordingly, it helps inform the educators who seek to improve the IL instructions in digital environments. Furthermore, the alternative paradigms of measurement and assessment explored will acquaint IL practitioners the salient foundational principles upon which sound information literacy assessment practice should be based.

Assessment data gathered from a representative sample can provide concrete evidence of the effectiveness (strengths or weaknesses) of the information assessment procedures of a particular institution. And through this, one may find additional applications for this assessment approach to enhance the quality of assessment tool. With the cognizance, that there is no assessment that fits for all population or institutions and each assessment methodology has its weaknesses and strengths. There is no magic formula that allows one to match the perfect delivery method to particular circumstances. Thus then it is important to explore and publish a variety of assessment approaches to expand this area of knowledge.

This paper contributes to the base of empirical research about IL instruction in higher education, and assessment using the ACRL Standards in the context of technology. Research in quantitative assessment tool development criteria, in which this paper aims to achieve, will provide another opportunity to measure our contribution to the educational missions of higher education institutions. This may also prompt more widespread acceptance of the role of IL in higher learning environment.

Significantly, the study will help the process of developing / remodeling a quantifiable assessment tool to measure the IL skills of higher education students. Though the experience entails a highly instructive endeavor but perhaps the most rewarding process will be when one observes the development of information competency skills and observing the students' reactions as they complete the assessment activity. The paper provides different methods for approaching the assessment of IL skills by examining various assessment procedures for higher education and focusing on tool development based on desired learning outcomes established by ACRL competency standards and the growing consensus that graduates should leave higher education with the 21st century literacy skills.

It may sound ambitious, but this study hopes to model a quantifiable assessment tool that will not only provide practitioners in the field of IL with a valid and reliable tool but ultimately will facilitate a standardized assessment tool in Asia that will convince educators and IL practitioners in the region the need for an Asian-wide information literacy initiatives. It is important to have our own IL standards for higher education that adds dimensions to our Asian mind and Asian culture as well as generic social factors that can be systematically considered and incorporated in the assessment. This will surely signal an indication to faculty, library managers and administrators that IL should feature on the strategic agenda in all higher education institutions in the region.

RESEARCH METHODOLOGY

There are three phases that comprised the research methodology:

Phase 1

An assessment review of various qualitative and quantitative assessment strategies of IL currently used by higher education institutions accessible online. The selection process, considered the recently developed instruments that are widely cited/used by other researchers/authors which provide some indication of its endorsement. The evaluation thus focuses on examining the specific defining assessment characteristics such as course definition/description, scores, reliability, validity, method design, strength and limitation of the instruments.

In the process of reviewing and getting acquainted with the details of the assessment tools, we (as time permit) took the tests that are accessible online. This will allow us to experience all steps of the quiz module including the tutorial and background questions, to explore the various instruction dynamics of IL for higher education. Subsequently, some tests were sampled to students taking two courses (namely WXGB6328 Reading and Information Literacy and WXES2112 Critical Thinking and Communication Skills) at the Faculty of Computer Science & Information Technology, University of Malaya. Furthermore, specific methods and instruments are examined with the purpose of evaluating their potential for empowering students as active participants in their own learning and in the assessment process focusing on information competence through interaction with technology. In the end, these were matched to the ACRL standards and performance indicators. The learning outcomes proved to clarify and flesh out the meaning of each competency standard.

Phase II

From the intensive reviews of the assessment instruments, we will develop / utilize / revise assessment strategy taking into account what the various assessment procedures valued most. Specifically, we will examine the application and results of an assessment tool and its connectivity to instructional strategies for improving information literacy outcomes. ACRL's IL competency standards for higher education will be the basis for the construction or adaptation of the assessment tool in the context of technology. Most colleges and universities adapt qualitative assessment procedures through administration of IL tests in various forms, IL skills inventory and interviewing strategies.

Phase III

The final phase of the study is the assessment and standard setting process of a new or chosen / modified instrument, which we consider as the most challenging part of this study. We will determine the subject for the generic (developed, adapted or modified) instrument suitable for assessment. A group of panelists consists of professionals with direct experience in IL and technology education in higher education will be invited to participate in the study. The number of panelists will be determined as the study progresses to final phase. Each panelist will independently make standard-setting judgments for each item question in the assessment tool based on their knowledge, intuition or expert opinion. The process aims to provide an overview of these measures and determine a systematic categorization of individual test item to give the reader a clear picture of precisely what is it trying to measure. The standard-setting process will adapt a modified, Delphi technique in validating the assessment procedure – this is to facilitate the effort to systematize the assessment of IL for higher education.

INITIAL FINDINGS AND EVALUATION FOR PHASE I

Assessment reviews of information literacy assessments for higher education through selected evaluation attributes

An initial review (sampling of the numerous assessment instruments) is currently carried out to assess IL for higher education accessible online. The selection process, considered the recently developed instruments that are widely cited/used by other researchers/authors which provide some indication of its endorsement. Condensations of some salient issues and specific defining assessment characteristics that can be identified, compared and studied are presented; such as course description / definition, scores, reliability, validity, method design, strength and limitation. Tables 1-7 provide a detailed description of assessment programs for higher education integrating the extant definition of information literacy with the combination of cognitive and technical skills.

Table 1: 21st Century Information Fluency*
(Source: University of Illinois, Illinois Mathematical and Science Academy, http://21cif.imsa.edu & University of Central Florida http://if.ucf.edu)

Definition Description	Scores	Reliability	Validity	Method Design	Strengths	Limitations
Information fluency combines information literacy with critical thinking and computer literacy skills. Focuses on information competence as demonstrated through technology.	The format of the quiz is mixed, including both objective style questions (such as multiple choice, T/F) as well as essay and/or short-answer questions. Scoring of each item question follows the rubric assigned in each task	No reliability evidence reported	Validation studies in progress	Power searching in web2 environment Micro Modules self-paced, on demand learning experiences each tailored to a specific topic. Designed as 10-15 minute tutorials. Most contain audio and/or video segments to communicate key concepts.	Involves Internet search skills that start with understanding how digital information is different from print information, knowing how to use specialized tools for finding digital information and strengthening the dispositions needed in the digital information environment. Combine play and performance while you strengthen your Internet searching and evaluation skills.	Requires sophisticated computerized testing facilities, high band-width and support services. Some tutorial modules are fee-based. It functions well in information and technology rich environment.

*Information fluency is the ability to apply the skills associated with information literacy, computer literacy and critical thinking to address and solve information problems across disciplines, across academic levels, and across information format structures

Table 2: Education Technology Service (ETS) ICT Literacy Assessment iSkills (Source: ETS, http://www.ets.org/ictliteracy)

Definition Description	Scores	Reliability	Validity	Method Design	Strengths	Limitations
iSkills ICT literacy is a specialization of information literacy, focusing on information competence as demonstrated through technology. Diagnostic assessment	There are 60 items derived from performance on 15 interactive, performance-based tasks. The scoring of the items follow rubrics that specify the nature of responses needed to gain full credit raw score on the assessment is the sum of all item scores.	The reliability cannot be reported yet because the measure consists of a single question. (to be followed up)	The study provides some evidence for the convergent and discriminant-validity of the assessment paving the way for its use to evaluate instructional programs on ICT literacy.	The Core iSkills assessment (entering college) The Advanced iSkills assessment for junior college and beyond	Focuses on the critical thinking and problem solving individual does when dealing with information in digital environment It consists of communication and research that occur in the context of technology. It conforms closely to the ACRL Standards.	ICT literacy seems to emphasize the technology rather than the content or information. It functions well in information and technology rich environment. It is diagnostic and fee based.

Table 3: Information Competence Project (Source: California State University; http://www.lib.csusb.edu; http://www.calstatela.edu)

Definition Description	Scores	Reliability	Validity	Method Design	Strengths	Limitations
Information Competence through Competency based mastery Discipline specific information literacy Skills in information literacy and library research	Breadth of responses quantifies the # of different types of responses. Depth of responses quantifies the # of discrete ideas offered to elaborate on the specifics on initial (breadth) responses to the scenarios.	To be conducted when time and resources become available.	Not reported	Based on non-linear methodology, information tasks were defined as information competence scenario Responses to scenarios were quantified by breadth and depth.	Actual online library instruction experience to ensure students are well equipped for the Information Age Comprehensive and leaves few gaps based on current definitions of IL.	It functions well in information and technology rich environment Tutorials and quizzes perform best on high-speed connections.

Table 4: Information Skills Survey Evidence Based Approach (Source: Canadian and Australian University Libraries (CAUL ISS))

Definition Description	Scores	Reliability	Validity	Method Design	Strengths	Limitations
nformation Skills Survey Benchmarking nformation iteracy ttainment across niversities by iscipline	A 20 item self-report inventory of information literacy skills of higher education students. It exists in two forms, namely a generic form and a discipline specific form. (law and medical students)	Using Cronbach Alhpa are 0.85 for 1st year and 0.84for 4th year students Overall R=0.87 Satisfactory levels of reliability between 0.54 and 0.78	A pool of items have been cross-validated using a blind protocol. The generic form has demonstrated content, construct and concurrent validity within the context in which the survey was developed.	An assessment tool for Information Literacy for use at an institutional level across disciplines based on ANZILF	It promotes the inclusion of information literacy and related generic attributes in teaching and learning It consists of communication and research that occur in the context of technology.	Assessment professionals must be knowledgeable about the administration of instrument and base knowledge about the discipline

Table 5: Information Literacy and Computer-Based Testing Clusters: James Madison University http://www.lib.jmu.edu (Source: NPEC, 2005)

Definition Description	Scores	Reliability	Validity	Method Design	Strengths	Limitations
Clusters are currently being developed. The arts and humanities cluster is complete and psychometric data are being collected.	Each of five clusters includes a score for information searches related to the discipline specific category. The information literacy module is an 80-item test. The complete psychometric properties will be forthcoming at release time. Those included here are based on the pilot instrumentation.	Cronbach's alpha= .65	Validation studies in progress	Correlations and descriptive comparisons between paper and-pencil and computer-based testing Item analysis Student ratings of multimedia items	A rare combination of online tutorials/ computer-based testing and psychometric qualities. Has the best overall potential as a measure of information literacy and other constructs, e.g., critical thinking.	Requires sophisticated computerized testing facilities, high band-width, and support services. Assessment professionals must be knowledgeable about the administration of instrument

Table 6: University of Texas System Online Tutorial (TILT) http://tilt.lib.utsystem.edu (Source: NPEC, 2005)

Definition Description	Scores	Reliability	Validity	Method Design	Strengths	Limitations
Skills in information literacy and library research	Tutorial modules include online multiple-choice tests that are scored and archived for future use	None reported	None reported	Research Survival Guide Interactive information literacy tutorial by UT System Digital Library	Online programs are easily accessible and free of charge. Tutorials are specifically aimed at information literacy in its broadest manifestation.	The tests embedded in the modules have not been placed under psychometric scrutiny. N0 embedded tests, though there are interactive uses of IL skills.

Table 7: Quiz Module and Online Tutorials : Purdue University Library CORE+ http://core.lib.purdue.edu (Source: : NPEC, 2005)

Definition Description	Scores	Reliability	Validity	Method Design	Strengths	Limitations
Comprehensive Online Research Education (CORE) Skills in information literacy and library research	Tutorial modules include online multiple-choice test that are scored and banked for future use.	None reported	Validation studies in progress	CORE modules focus on research process and student can measure mastery through exercises and quizzes	Online programs are easily accessible and free of charge. Tutorials are specifically aimed at information literacy in its broadest manifestation.	The tests embedded in the modules have not been placed under psychometric scrutiny.

Tutorials and assessment modules for information literacy based on the ALA Association of College and Research Libraries (ACRL) standards

This section presents an overview of the ACRL Information Literacy Standards

- Introduced by Association of College and Research Libraries, a division of American Library Association.
- Approved by their Board of Directors on January 18, 2000.

- So far has been endorsed by the American Association of Higher Education and the Council of Independent Colleges. In Australia, adopted by Council of Australian University Librarians (CAUL, 2000)
- Formally known as Information Literacy Competency Standards for Higher Education.
- ACRL included 5 standards of information literate person and 22 performance indicators and 87 learning outcomes.
- Structurally:

Competency Standards	Performance Indicators	Learning Outcomes
Standard1	4	17
Standard 2	5	22
Standard 3	7	25
Standard 4	3	10
Standard 5	3	13

- Normally, for each performance indicators, there are between 2-7 learning outcomes that can be used to assess students' progress in information literacy for higher education. These outcomes serve as guidelines for faculty, librarians, and others in developing assessment methods for measuring student learning in the context of the institution's mission.
- The outcomes are based on "higher order" and "lower order" thinking skills as introduced by Bloom's Taxonomy of Educational Objectives.

Table 8 presents an example of the evaluation of tutorials and learning quiz modules and assessment procedures for Information Literacy based on the Association of College and Research Libraries (ACRL) Standards. Due to space constraint only Standard One is presented in this paper.

Table 8: Evaluation of Tutorials and Learning Quiz Modules and Assessment Procedures for Information Literacy ACRL Standard One

ACRL Competency	Learning Outcomes					
Standard One information literate student ermines the nature and extent ne information needed **Performance Indicator** information literate student nes and articulates the need nformation	Confers with instructors and participates in online discussion to identify a research topic or information need	Develops a thesis statement and formulates questions based on the information need	Explores the general information sources to increase familiarity with the topic	Defines or modifies the information need to achieve a manageable focus	Identifies key concepts to describe information need	Recognizes that existing information can be combined with original thought, experimentation and/or analysis to produce new information
rmation Fluency (UCF)	X	√	√	√	X	√
iteracy Assessment *iSkills*	X	√	√	√	X	√
L ISS Information Survey Skills	X	√	√	√	√	√
ornia State University	√	√	√	√	√	√
ersity of Texas System Online rial (TILT)	√	√	√	√	√	√
ue University Library CORE+ Module	√	√	√	√	√	√

Education Technology Service (ETS) ICT literacy framework

This section presents the ETS ICT literacy framework. Table 9 detailed the seven competency levels in the framework.

Table 9: ETS ICT Literacy Framework (Source: Katz, 2008)

Define: Understand and articulate the scope of an information problem in order to facilitate the electronic search for information, such as by • Distinguishing a clear, concise, and topical research question from poorly framed questions, such as ones that are • overly broad or do not otherwise fulfill the information need • Asking questions of a "professor" that help disambiguate a vague research assignment • Conducting effective preliminary information searches to help frame a research statement
Access: Collect and/or retrieve information in digital environments. Information sources might be Web pages, databases, discussion groups, e-mail, or online descriptions of print media. Tasks include • Generating and combining search terms (key words) to satisfy the requirements of a particular research task • Efficiently browsing one or more resources to locate pertinent information • Deciding what types of resources might yield the most useful information for a particular need
Evaluate: Judge whether information satisfies an information problem by determining authority, bias, timeliness, relevance, and other aspects of materials. Tasks include • Judging the relative usefulness of provided Web pages and online journal articles • Evaluating whether a database contains appropriately current and pertinent information • Deciding the extent to which a collection of resources sufficiently covers a research area
Manage: Organize information to help you or others find it later, such as by • Categorizing e-mails into appropriate folders based on a critical view of the e-mails' contents • Arranging personnel information into an organizational chart • Sorting files, e-mails, or database returns to clarify clusters of related information
Integrate: Interpret and represent information, such as by using digital tools to synthesize, summarize, compare, and contrast information from multiple sources while • Comparing advertisements, e-mails, or Web sites from competing vendors by summarizing information into a table • Summarizing and synthesizing information from a variety of types of sources according to specific criteria in order to compare information and make a decision • Re-representing results from an academic or sports tournament into a spreadsheet to clarify standings and decide the need for playoffs
Create: Adapt, apply, design, or construct information in digital environments, such as by • Editing and formatting a document according to a set of editorial specifications • Creating a presentation slide to support a position on a controversial topic • Creating a data display to clarify the relationship between academic and economic variables
Communicate: Disseminate information tailored to a particular audience in an effective digital format, such as by • Formatting a document to make it more useful to a particular group • Transforming an e-mail into a succinct presentation to meet an audience's needs • Selecting and organizing slides for distinct presentations to different audiences. • Designing a flyer to advertise to a distinct group of users

CONCLUSION

We have attempted to take snapshots of the first seven IL assessment procedures for higher education using the lens (the evaluation criteria) through which different teaching and learning assessment approaches unfold. Then in the process, we recognized that the lens itself shapes how we interpret the salient aspects of the construct which is information literacy and the conceptions and pedagogy of IL for higher learning.

In order to adequately assess this construct, assessment reviews of selected tutorial and quiz modules that measures IL competence offered at higher learning colleges and universities are conducted. The assessment review is the primary research technique using selected assessment characteristics that can be identified, compared and studied; such as scores, definition, reliability, validity, method/design, strength and limitation of the assessment procedures. As it is, there is a need to further examine some of the assessment properties like reliability and validity and other psychometric and statistical concepts - how they were achieved in some instruments. Also, most measurement approaches have indicated interactive tutorials and quiz modules are not, by their very nature, easily validated by standardization procedures. Some have complex set of variations, yet they are clearly aimed to analyze and evaluate the magnitude of learning competence of students to predict future performance in the academia and to workplaces.

The readings and the preliminary reviews suggest that existing instruments of assessments for higher education IL allow to estimate knowledge and the range of how one can know or understand in dealing intelligently with information. The construct of IL assessment evolved in increments that can be tied to changes in emphasis in cognitive domains, statistics and to advancements in technology. Further, the breadth of possible outcomes touches every curriculum and discipline interlacing multi-literacy skills in the context of technology. These indicate further that there is no assessment that fits for all population or institutions and each assessment methodology has its weaknesses and strengths. Yet, the guiding principle should always be to choose the most appropriate measurement tool available to measure and achieve the desired learning outcome. IL competencies are process skills they grow with students and equip them to learn how to learn in an endlessly evolving information landscape. But even when paradigms shift, it is still an increasingly strategic issue for universities where pivotal concerns is placed on learning and teaching strategies that deliver the skills that students need to thrive in an increasingly competitive graduate employment workplace. Hence, with the rapid pace of technological change, skills need continual updating and renewing.

Most universities adapt qualitative assessment procedures based on the ACRL, the Bloom's Taxonomy of Cognitive Skills and few others use ANZILF, SAILS standards through administration of IL tutorials and tests, IL skills inventory, rating scales, web-based assessment questionnaire and web interviews – if test scores cannot be adequately interpreted without other pertinent information about the student. Apparently, the application of the ACRL Competency Standards for Higher Education's defined learning outcomes in the development of an assessment tool and course content proved to be an invaluable mechanism in the pedagogical design of the course program and assessment procedures. In examining the ACRL standards it is easy to understand that it goes beyond the university and academic life. Significantly, IL includes many of the skills associated with conducting research as well as the tools used to manipulate and communicate information. This strongly indicates the realization that information literacy exists as an integral part of students' learning assessment is basic and is now

widespread internationally. And to whatever extent and manner, the results are important to make assessments a natural part of teaching and learning throughout the process of learning.

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