

PREPARING INFORMATION PROFESSIONALS FOR LEADERSHIP IN THE NEW AGE

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Enhancing Students' Learning and Research with NTU Library's Innovative Information Literacy Programmes

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Abstract:

The Nanyang Technological University (NTU) Library has been pioneering and initiating bibliographic instruction and information literacy programmes since the inception of the university as a technological institute back in 1981. The evolving academic and research landscape since then, coupled with technological advancements in the provision of information resources and services, has provided the impetus for NTU Library to develop a structured information literacy programme with the aim of enhancing students' learning and research. The objectives of the programme developed are clearly stated and closely aligned to the university's as well as the library's mission statements. This paper provides a historical perspective and traces the development of this programme over the years. A model of the programme as it is currently offered to students is presented. Discussion will focus on a number of aspects: information literacy standards consulted, identification of students' learning outcomes, a spectrum of delivery mode and methodology, evolving and expanding content development, as well as, formative and summative feedback. The paper also looks at the enablers of the programme, which include librarians, library management, faculty members, schools' administrative units, external instructors and trainers, and technology. The paper concludes with a look at the future of the library's information literacy programme beyond 2006 and will address crucial issues which impact upon the implementation and running of the programme across all schools in the university. Issues like profiling of students, matching programme type and delivery mode with these profiles, leveraging on emerging technologies as learning tools and integrating students' assessments can be further researched. A deep insight and understanding of these issues will in return stimulate further the development by the library of a more innovative and creative information literacy programme for the university.

Keywords:

Information literacy, model, learning outcomes, implementation, enablers, instructional librarians, subject librarians, students, learning styles, student profiles, lifelong learning

1. Introduction

Students coming into the university now are faced with a challenge. It is a challenge of navigating the plethora of information from a variety of accessible resources and getting to the relevant information that they are interested in while avoiding the rest. It is undeniable that information assumes a position of unprecedented importance and availability in their learning and research. Those who know, will succeed; those who do not know, might blunder, misstep, even fail...

The Nanyang Technological University (NTU) Library has been pioneering and initiating bibliographic instruction and information literacy programmes since the inception of the university as a technological institute back in 1981. The Library has taken the lead in collaborating with various schools within the university in running information literacy programmes with the prime objective of ensuring that our students succeed in meeting and overcoming this challenge. Often times we hear students lamenting feeling information overload and simultaneously information saturated when faced with the information glut confronting them in their research and project work. NTU Library's information literacy programmes, with the focus on empowering our students with the necessary skills to explore, find and exploit information that they need for their study, research, work and leisure, are proving to be an essential component in the learning experience of our students, contributing as well towards their lifelong learning experience.

2. Vision and Mission

The vision of NTU is to be a global university of excellence; steep in ideals, passion, creativity and entrepreneurship (Nanyang Technological University, 2006). The mission of the university is to educate leaders and advance knowledge for Singapore and beyond. To achieve this vision and mission, new curriculum initiatives and a new learning paradigm have been instituted. The university aims to produce graduates for the knowledge-based economy who are prepared for new challenges and who possess skills for lifelong learning. A flexible, broad-based undergraduate curriculum is offered within a new learning paradigm where students are empowered with "anywhere anytime computing" and exposed to enhanced learning resources and delivery channels. This new learning paradigm also aims to promote a broader and more engaging education and lifelong learning for students.

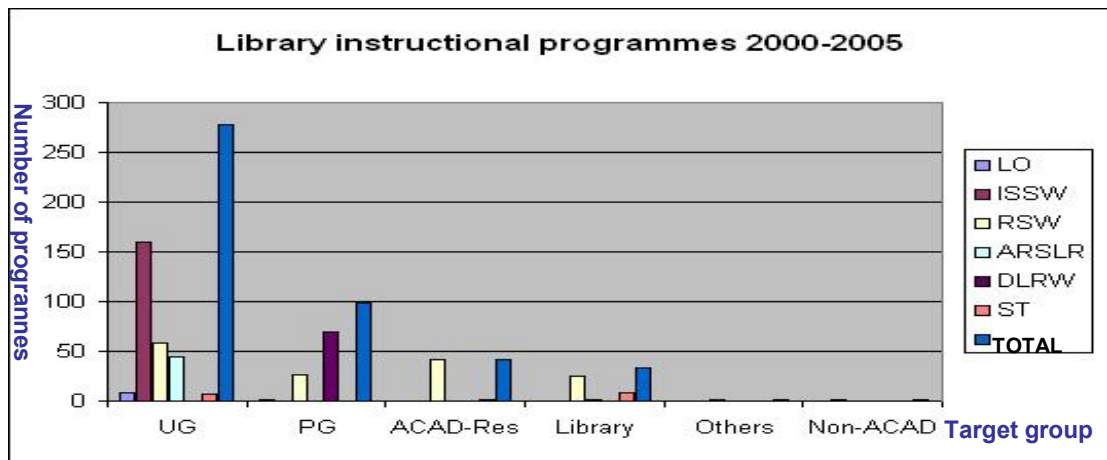
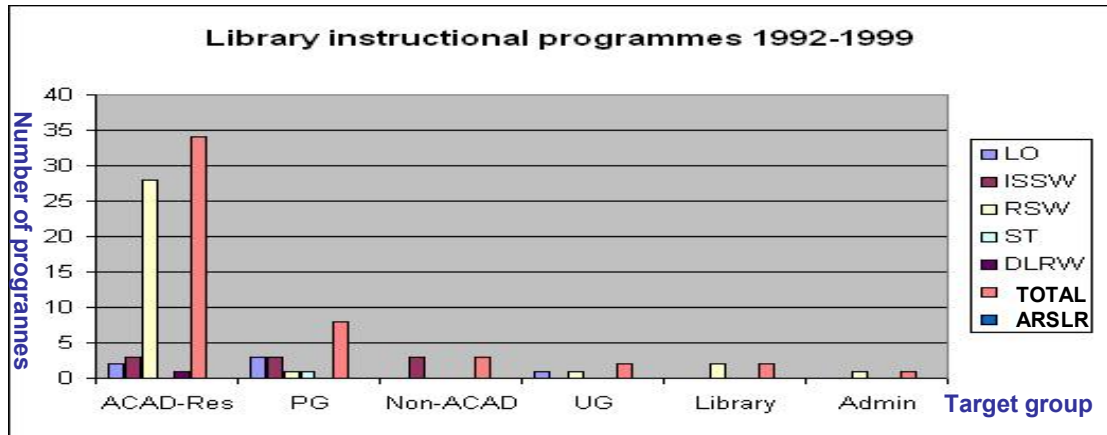
Aligning itself with the university's vision, the library's mission is to provide the NTU community with access to rich and relevant information resources to support their research, teaching and learning activities (Nanyang Technological University Library, 2005). To achieve this mission, a set of goals has been set to guide the library in its path towards realization. These goals include the development of programmes that are oriented towards and centred on users; the provision of effective, responsive and innovative services; the utilization of library and information technology innovatively; the delivery and promotion of effective use of information resources to support and enhance the teaching and learning processes in the university and the provision of an information rich environment that supports and encourages excellence in research and scholarship.

3. Instructional Programmes

Students in higher education need to possess a broad spectrum of skills as well as the ability to have a broad vision and an understanding of human and social factors. They have begin to realise that skills and technology become obsolete over time and one can no longer rely purely on just one skill alone to succeed, lead and be part of an educated citizenry. The mastery of information skills, along with literacy, numerate, interpersonal and information technology skills, is critical to the development of an educated leader as we enter the knowledge-based economy of the 21st century. The library recognizes this fact and has always given its due importance in the training of our students through its instructional programmes.

a. Past Programmes

What has NTU Library offered to their students over the years? The following two charts show the delivery of library instructional programmes in NTU since 1992.



Key to programme type:

- LO – Library Orientation
- ISSW – Information Searching Skills Workshop
- RSW – Resource Specific Workshop
- DLRW – Doing Library Research Workshop
- ARSLR – Advanced Research Seminar (Literature Review)
- ST – Subject Tutorial

The initial focus has been to create awareness and encourage usage of online electronic resources amongst faculty. Over the years, there has been a gradual shift in focus as more instructional programmes have been rolled out for our undergraduate and graduate students. The appointment of an Instructional and Research Support Librarian in April 2000 and subsequently the creation of an Instructional Services Division within the library in October 2004 have acted as catalysts for the increasing focus on instructional programmes for students. With the expanding student population and academic programmes, more attention and emphasis have been given to programmes which seek to inculcate good information search habits and library research skills. These programmes also contribute to the university's student-centric new undergraduate experience mission to enhance the quality of student's academic life.

In the academic year 2004-2005 for instance, final year students from the Nanyang Business School go through our Advanced Research Seminar and learn the various phases in doing a literature review before they embark upon their final year project work. A typical feedback received from students who sat through the programme was that this seminar should be offered to first year students. It was felt that it was better to build student's research skills right at the beginning in their first year as they may find the skills acquired useful for their other academic exercises as they scale through their years of study in the university. In fact, in the same academic year, first year common engineering students have been provided with instructional workshops, and in the process, learn to develop and apply successful information search strategies. First year students from the School of Communication and Information and second year students from the School of Materials Engineering were also similarly exposed to this basic understanding of the information search process. In addition, all these students have been coached to be critical when evaluating information sources they come across in their information seeking.

b. Stated Mission and Desired Outcomes

The evolving academic and research landscape, coupled with technological advancements in the provision of information resources and services, has provided the impetus for NTU Library to develop a structured information literacy programme with the aim of enhancing students' learning and research.

The stated mission of the Instructional Services Division in NTU Library is to ensure the provision of quality campus-wide library instructional programmes so that students and staff of the university are empowered with the necessary information literacy skills for their study, research, teaching and work; thus enriching and contributing towards their advancement of knowledge and lifelong learning.

Desired outcomes have been identified arising from this mission statement and they include the following:

- A range of well-structured and well-prepared instructional programmes is designed and offered by the Library to help develop the information skills of the university community
- All undergraduate students are information literate and are conversant with conducting literature review competently in their subject areas by the time they graduate
- All graduate students and researchers are keenly aware of the scholarly communication process and are effective in using information resources in their subject areas

- All library resources are used heavily by staff and students as they realize the positive impact these have on their research and study
- Information skills lessons are conducted competently by librarians in an engaging and effective way that is relevant to users' needs
- There are sufficient places provided for all users who wish to attend any library instructional programme
- Users can utilize a range of effective learning materials developed by the Library (in print and online formats) to reinforce and supplement their learning and acquisitions of information skills
- The library information skills programmes are effectively integrated with the curriculum in all undergraduate studies

4. Information Literacy Programme Model

Taking into consideration the mission and vision of the university and the library as well as the stated need of students to be imbued with critical lifelong learning skills and crucially, information skills, a comprehensive and incremental information literacy and skills programme is now offered to students in the university. This programme model is in essence a consolidation and rationalization of past programmes which have now been structured and restructured into a working model applicable to the learning and research environment of the university.

a. Primary Objectives

Primary programme objectives have been clearly identified when formulating the range of programmes offered in the model. These objectives are:

- To track the acquisition, development and application of information literacy skills and competencies of students from the point of their entry into the university and subsequently, upon their graduation and entry into the economic workforce
- To empower students with the necessary information seeking skills to explore, find and exploit information that they need for their study, research and work
- To equip students with an added intellectual skill for lifelong employability
- To enrich the lifelong learning experiences of students

b. Learning Outcomes

In identifying learning outcomes for the programme as a whole, the library looked at ACRL's Information Literacy Competency Standards for Higher Education as the benchmark for setting these learning outcomes. Other standards consulted include SCOUNL's The Seven Pillars of Information Literacy Model and CAUL's Information Literacy Standards.

Students going through the programme are thus able to:

- Understand the process of information literacy and effective information use
- Be familiar with the range of information sources and their characteristics and use
- Understand the use and value of information and information resources in the context of their subject discipline and society at large
- Be able to source and search for information using the right techniques and tools, and evaluate and organise the information suitably for presentation and use
- Make good use of NTU Library and its systems, as well as other libraries, and the internet

c. The Model

Table 1 represents the model of NTU Library's information literacy programme as it was implemented in academic year 2005-2006.

Table 1: NTU Library's Information Literacy Programme Model

PROGRAMME TYPE	TARGET AUDIENCE	METHODOLOGY	CONTENT	OBJECTIVES
Information Searching Skills Workshop Subject Based Course Integrated or School Related Offered by Library or requested by School/lecturer 1.5 – 2.0 hrs duration	1 st and 2 nd year undergraduates Compulsory for Course Integrated Online registration required for School Related	Classroom based – max 50 to a class Subject and instructional librarian as instructors Instructional with hands-on Workshop formative and summative feedback	1. Understanding the information search process 2. Searching information sources 3. Citing sources / references	1. To provide an overview of the information search process 2. To equip students with information seeking skills for their assignments and research 3. To learn how to cite sources/references
Advanced Research Seminar (Literature Review) Subject Based School Related Offered by Library or requested by School 2.5 – 3.5 hrs duration	3 rd and final year undergraduates Online registration required	Classroom based – max 25 to a class Subject and instructional librarian as instructors Instructional with hands-on Seminar formative and summative feedback	1. Doing research and project planning 2. Overview of literature review process 3. Research questions 4. Developing search strategies 5. Evaluating and searching information sources 6. Searching citations 7. Content analysis and organizing information	1. To provide an overview of the literature review process 2. To equip students with information seeking skills for their applied research project 3. To share strategies for organising, evaluating and analysing information

			8. Writing your literature review 9. Ethics of research	
<p>Doing Library Research Workshop</p> <p>Subject Based</p> <p>Course Integrated or Course Related</p> <p>Offered by Library or requested by School/lecturer</p> <p>2.5 – 3.0 hrs duration</p>	<p>Postgraduates</p> <p>Compulsory for Course Integrated</p> <p>Online registration required for Course Related</p>	<p>Classroom based – max 25 to a class</p> <p>Subject and instructional librarian as instructors</p> <p>Instructional with hands-on</p> <p>Workshop formative feedback</p>	<p>1. Literature review process</p> <p>2. Information search process</p> <p>3. Information cycle and timeline</p> <p>4. Structure of scholarly information</p> <p>5. Types of published literature</p> <p>6. Developing search strategies</p> <p>7. Searching information sources</p> <p>8. Searching citations</p> <p>9. Organising information</p> <p>10. Ethics of research</p>	<p>1. To provide an overview of the literature review process</p> <p>2. To equip students with information seeking skills for their project and research work</p> <p>3. To share strategies for organising, evaluating and analysing information</p>
<p>Resource Specific Workshop</p> <p>Covers subscribed e-resources and the bibliographic management software, EndNote</p> <p>Offered by Library</p> <p>1.5 – 3.0 hrs duration</p>	<p>Students and staff</p> <p>Online registration required</p>	<p>Classroom based – max 25 to a class</p> <p>Subject and instructional librarian as well as trainers from vendors of specific resources as instructors</p> <p>Instructional with hands-on</p> <p>Workshop formative feedback</p>	<p>1. Introduction to the specific resource</p> <p>2. Accessing the specific resource</p> <p>3. Main features</p> <p>4. Search functions</p> <p>5. Downloading records</p> <p>6. Integration with bibliographic management software (as applicable)</p>	<p>1. Be familiar with the range of information sources and their characteristics and use</p> <p>2. Be able to source and search for information using the right techniques and tools, and evaluate and organise the information suitably for presentation and use</p>
<p>Subject Tutorial</p> <p>Includes citation searching and analysis</p> <p>Offered by Library</p> <p>1.0 – 2.0 hrs duration</p>	<p>Students and staff</p> <p>Online registration required</p>	<p>Classroom based – max 25 to a class</p> <p>Subject and instructional librarian as instructors</p> <p>Instructional with hands-on</p> <p>Tutorial formative feedback</p>	<p>1. Introduction to range of information resources within the subject discipline</p> <p>2. Searching and evaluation of these information resources</p> <p>3. Types of literature within the subject discipline</p>	<p>1. Understand the use and value of information and information resources in the context of their subject discipline</p> <p>2. Be familiar with the range of information sources in their subject discipline and their characteristics and use</p>

A spectrum of delivery and collaboration for the programmes on offer in the model is available to all schools. These range from the library initiated subject and school based programmes to those which are integrated into courses subsequent to requests received from lecturers to have them included in their curriculum. All programmes offered are classroom based, with instructors delivering a lecture or making a presentation and blending it with a significant amount of time allocated for hands-on practical exercises. Contents for these programmes are continually evolving and expanding. Instructors meet at least two months earlier before any scheduled programme to review formative and summative feedback received from students for previous runs of programmes and revise, update, remove or expand programme content where necessary.

How does the library's information literacy programme model translate in its implementation for a specific degree programme and school in the university?

Table 2 provides an example of its implementation for a 4-year degree programme.

Table 2: Implementation of the information literacy programme for a 4-year (2006-2010) bachelor's degree programme in NTU

YEAR	PROGRAMMES	COMPLETION DATE	
		Planned	Actual
Upon matriculation 2006	<u>Assessment:</u> 1. Review survey to assess level of information literacy skills of students <ol style="list-style-type: none"> a. Preparation of survey questionnaire b. Administration of survey c. Analysis of survey results d. Survey report 	Jun 2006 Jul 2006 Aug 2006 Sep 2006	
1 st Year 2006-07	<u>Workshop:</u> 1. Information Searching Skills Workshop <ol style="list-style-type: none"> a. Conduct workshop b. Post-workshop feedback analysis c. Feedback report 	Aug 2006 Sep 2006 Oct 2006	
2 nd Year 2007-08	<u>Workshops:</u> 1. Resource Specific Workshop 2. Subject Tutorial <u>Assessment:</u> 1. Review survey to assess level of knowledge acquisition and application of information searching skills <ol style="list-style-type: none"> a. Preparation of survey questionnaire b. Administration of survey c. Analysis of survey results d. Survey report 	Aug 2007 Sep 2007 Oct 2007 Nov 2007 Jan 2008 Feb 2008	
3 rd Year 2008-09	<u>Workshops:</u> 1. Resource Specific Workshop 2. Subject Tutorial 3. Advanced Research Seminar (Literature Review) <ol style="list-style-type: none"> a. Conduct workshop b. Post-workshop feedback analysis c. Feedback report 	Aug 2008 Sep 2008 Feb 2009 Mar 2009 Apr 2009	
4 th Year 2009-10	<u>Workshops:</u> 1. Resource Specific Workshop	Aug 2009	

	<p>2. Subject Tutorial</p> <p><u>Assessments:</u></p> <p>1. Students post-seminar survey to assess learning outcomes of students</p> <ol style="list-style-type: none"> Preparation of survey questionnaire Administration of survey Analysis of survey results Survey report <p>2. Faculty post-seminar survey to determine impact and value of information literacy programme</p> <ol style="list-style-type: none"> Preparation of survey questionnaire Administration of survey Analysis of survey results Survey report 	<p>Sep 2009</p> <p>Jan 2010</p> <p>Feb 2010</p> <p>Apr 2010</p> <p>Jun 2010</p> <p>Jan 2010</p> <p>Feb 2010</p> <p>Apr 2010</p> <p>Jun 2010</p>	
After Graduation 2010-	<p><u>Assessment:</u></p> <p>1. Assessment survey to measure relevance and application of information literacy skills in working life</p> <ol style="list-style-type: none"> Preparation of survey questionnaire Administration of survey Analysis of survey results Survey report 	<p>Dec 2010</p> <p>Jan 2011</p> <p>Mar 2011</p> <p>May 2011</p>	

5. Enablers

The successful implementation of the library's information literacy programme depends on the following enablers:

a. Librarians

Instructional and subject librarians form the core team of instructors for the programme. The recent implementation of the subject librarians system in NTU Library has afforded our librarians greater visibility within the university community. Each and every one of our subject librarians has taken ownership of the development and promotion of instructional programmes for the various subject areas assigned. They work in direct collaboration with instructional librarians in designing and developing course content.

To perform creditably as instructors, certain desired competencies, skills and traits have been identified for our librarians conducting instructional programmes. Peer instruction, continuing education and training are mapped out annually to ensure that instructional and subject librarians share and build upon their knowledge of information literacy, research work, educational technology and techniques in pedagogy. These librarians would also be exposed to training programmes which focus on developing and conducting instructional programmes as well as building impactful instructional content. Good project management, people management and communication skills are also desired. At the personal level, we stress on the need for our librarians to lead and create impact and influence as they network with staff and students in implementing their respective information literacy programmes.

b. Library Management

Clear goals, direction and support from library management are crucial as this will set the pace for programme planning and implementation. They also provide the lead in promoting these programmes amongst the higher management levels in schools and the university administration.

c. Collaborative Partners

An impactful implementation of the information literacy programme requires the advocacy and support of a number of collaborative partners within schools, university departments and student bodies. Table 3 tabulates the roles of these prospective collaborative partners.

Table 3: Roles of collaborative partners

Collaborative partner	Role
Dean's Office	To provide endorsement and lead support for academic and administrative staff involvement in the programme
Academic divisions, individual faculty and school library coordinators	To provide advocacy, support and collaboration for integration of information literacy content in identified courses and curriculum
Undergraduate/Graduate/Research offices	To assist in administering workshops and surveys, including publicity, enrolment and registration of students in programmes, time-tabling and scheduling of workshops, as well as administering surveys and returns
Dean of Students' Office, Student Affairs Office, Office of Admissions, Office of Academic Services and Students' Union	To provide advocacy and assistance in publicity and profiling of students
Alumni Affairs Office	To assist in publicity, profiling of graduates and administering surveys
Centre for Educational Development	To provide advocacy and support for information literacy programmes offered via the e-learning portal, edveNTUre

d. Technology

NTU uses information technology (IT) extensively to facilitate learning, teaching and research. The university is well connected to the internet as all facilities and resources available over the internet are accessible by everyone on the campus network as well as off-campus. On campus, student learning is further facilitated by rich online learning materials, discussions groups and is augmented by NTU's excellent online digital library resources, all accessible via the campus wired, wireless and mobile networks. Abundant personal computers are available within campus to facilitate easy access to the internet and campus e-services. In addition, there are many computing laboratories distributed all over the campus in the various schools, equipped with personal computers. Altogether the university has over 8000 networked personal computers for the use of students and staff throughout campus.

The library information literacy programme leverages on this anytime anywhere NTU IT infrastructure. The library website and teamsites, which function within this infrastructure,

provide the supporting tools for librarian-faculty collaboration. In addition, the networked environment has facilitated online registration for the various library instructional programmes offered.

One other important enabler is NTU's online learning platform, edveNTUre. The library envisages more extensive use of this platform in the very near future as the drive for a blended approach of online and face-to-face library instructional programme takes shape.

6. Future – 2006 and Beyond

NTU Library has come thus far in establishing the framework and model for its information literacy programmes. Looking beyond 2006, how will the library's information literacy programme evolve to stay relevant in the ever-changing educational landscape while keeping pace with the competitive knowledge-based global economy? How can the library enhance students' learning and research skills through the development of more effective instructional programmes? The library has identified a number of critical issues that will have an impact on the implementation and running of instructional programmes across all schools in the university. These include:

a. Changing Educational Landscape

The educational landscape has been evolving due to globalization, high mobility, advancing technologies and the rapidly changing and competitive knowledge-based global economy. The socio-economic environment demands us to be information and technologically literate; and to be highly skilled and competitive. This generates a demand for higher education. Lifelong learning and self-improvement have also become the norm. Universities respond by diversifying their portfolio of academic programmes to provide a more flexible and diversified educational experience. More part-time, cross-disciplinary and double-degree courses are being offered in the universities. Great emphasis has also been placed on equipping students with critical skills and attributes, such as creativity, inventiveness, entrepreneurship, interpersonal and teamwork competencies as well as the ability to cope with continual change. All these are keys to success in the world today and the immediate future.

Globalization and mobility have indirectly shaped the educational landscape. More and more foreign students in the region are seen in the home ground. The Singapore government's impetus in creating and being the education hub in Asia has caused an influx of foreign students enrolling into local universities. The number of foreign students has been forecasted to reach 150,000 by 2012, as business executives and a growing middle class in parts of Asia look for schools outside the United States and Europe for their higher education needs (Reuters, 2003). Coming from different cultural backgrounds and experiences, these foreign students bring along with them a different set of challenges that libraries have to reckon with when designing and delivering their instructional programmes.

Technological advancements too have made a major impact on universities educational environment. Computers, software, the internet, intranet, digital information and wireless communications technology over the past 25 years have transformed the manner in which universities' design and deliver their programmes. It is no longer just the traditional model of campus-based teaching and learning. Increasingly, university education is embracing learning and discovery beyond geographical boundaries by adopting online teaching and

learning programmes. Understanding the university's teaching and learning framework and its use of innovations will provide some insights on how the library can design instructional programmes that are in line with the university's strategy and direction.

b. Diversified Students' Learning Styles

Another issue to reckon with is the diverse characteristics of present day students. The student population of today is increasingly diversified with varied needs and learning styles. These students could possibly belong to the "Baby Boomers" of forty-year-old adult learners or the twenty-something "Generation-Xers" who are enrolled in part-time undergraduate or graduate courses. They could also be the so called "Millennials, Net Generation or Y Generation" learners who were born in or after 1982. "Millennials" form the bulk of the undergraduate population presently and thus represent today's students. Next in line will be the "Z Generation" adolescents born in or after 1990, who will represent the next generation of college and university students.

Not only is the profile of these students different, the life experiences that shaped them are quite different from those of previous eras. Each generation is defined by its own set of experiences, giving rise to different perceptions, attitudes, beliefs, behaviours and communication styles (Oblinger, 2003). Such differences will generate distinct learning styles. Understanding these students' profiles will shed some light on how best we can develop and deliver our information literacy content.

What kind of characteristics do the net generation students exhibit? These students grew up with digital media integrated into their lives. They are comfortable with digital environment, navigating the world wide web, connecting through laptops, mobile phones, chat rooms, instant messenger services, blogs, broadband, wireless and video games. They assume technology to be a natural part of the environment. Their learning preferences tend toward teamwork and collaborative activities. They are visually-oriented and accustomed to figuring things out themselves through trial-and-error or experimentation. They are multi-taskers; goal and achievement oriented who expect immediate results and instant gratification. Staying connected is essential and considered part-and-parcel of their lives, with many owning multiple communication devices, such as mobile phones, PDAs, and all the while making use of the ubiquitous network provided by the university. Though techno-savvy, they are not familiar with library resources and lack the appropriate information skills to carry out research work. They instead "google" for research and rely heavily on the internet (*Educating the Net Generation*, 2005) which they perceive as their only information universe.

How then can the library accommodate and integrate the net generation learning style and leverage on emerging technologies to enhance students learning and facilitate information literacy integration into the curriculum?

c. Matching Programme Type and Delivery Mode to Students' Profiles

The library's strategy and approach is to adopt a blended mode of delivering instructional programmes that will appeal to the diverse learning types as students are enrolled in different subject areas at all academic levels with a broad spectrum of learning styles and levels of information literacy skills. It is strategically preferable to integrate information literacy into the course curriculum by working in partnership with faculty members.

Online teaching and learning which is learner-centred will in essence appeal to the net generation. It allows students to be actively involved in the learning process rather than sitting in class passively. It emphasizes interactivity, self-direction and learner-initiation (Hua, 2004). The sensory-rich multimedia and self-paced learning strikes a cord with the net generation learners who are visually-oriented and enjoy exploring within their own learning paradigm. This type of learning can also be accessed without the constraints of time and location and yet reach a larger population where traditional class time is not possible. Other benefits include accommodating different learning styles, optimising librarians' instructional time and reducing teaching repetitiveness.

It is envisaged that the library's online e-learning programme will incorporate generic theoretical and conceptual contents for students to initially and virtually gain a common foundation of information literacy knowledge before the in-person, face-to-face instructions with librarians. This mode of delivery could be integrated seamlessly into discipline specific courses conducted by faculty members and hosted on the NTU e-learning platform, edveNTUre. Such course integration will mean a wider participation level by students with the support and collaboration of faculty members. The library instructional programme course structure will adopt a modular design approach with several interrelated and independent components. Students are allowed the flexibility and convenience of switching and moving between modules and yet, not lose sight of the main course objectives. This online learning will be reinforced with face-to-face instructional programmes conducted by instructional and subject librarians, with the latter providing the focus on delivering discipline specific or subject based content.

d. Learning Tools – Leveraging on Technology

Emerging technologies have opened up new horizons for online teaching and learning but they also pose a different set of challenges for the running of library instructional programmes. As these net generation students are well versed in the latest technology, NTU library has to deliberate on how it can leverage on really simple syndication (RSS) feeds, blogs, podcasts and “pedia” technologies to actively promote information literacy programmes and push out information that will enhance students' learning and research skills.

The library is currently exploring the setting up of library blogs to highlight subject resources and instructional programmes and a research process blog to serve as a mechanism for students to discuss, seek advice and exchange valuable information resources they discover in the course of doing their research, project and assignments. The library can also tap on RSS feeds available through specific subscribed databases to push out relevant and up-to-date summaries and links that students and faculty can pull in to their personal web portals.

“Wikis” and “pedias” offer another excellent avenue for instructional or subject librarians to build collaborative subject content. Similar to a blog in structure and logic, a wiki allows flexibility to edit, delete, or modify content that has been placed on a site.

Another fast growing trend is the diverse and growing list of university lecturers adopting “podcasting” technology to engage students in learning beyond the classroom. Podcasting is a method of distributing audio or video content over the internet and taking advantage of the power of RSS. Students can subscribe to an audio or video feed of course topics or issues

and receive automatic downloads of content updates. The library can likewise make use of this medium to reach out to many net generation learners. One possible application is the recording of face-face library instructional programmes and the dissemination of these recorded contents to interested learners who subscribe to the service.

e. Assessment

All students should be assessed on their knowledge acquisition of information literacy skills to determine the effectiveness and impact of the library's online information literacy and face-to-face instructional programmes. A structured and continuing self-assessment through quizzes and other assessment tools can be embedded into the online learning programme as learners navigate, complete and receive immediate, system-generated feedback for self-assessment within each learning module. A final test at the end of each module will reinforce the understanding and learning at each section in the module. This self-assessment tool can also be used by subject librarians when they conduct the subject-based tutorials. In addition, online surveys can be employed to solicit formative feedback from students during face-to-face instruction.

To measure the impact of library's information literacy programmes and assess students' learning outcomes, the quality of the literature review and bibliography produced by students could be reviewed and assessed jointly by librarians and faculty members. This can help ascertain the critical value of library's instructional programme for the scholastic and research success of students. Subject librarians especially are in the best position to collaborate with faculty members in this regard.

7. Major Challenges

Implementing a comprehensive information literacy programme model across all schools in the university comes with its own set of challenges. Three major challenges are listed below:

1. A challenge to motivate and ensure that instructional and subject librarians continually advance their knowledge in information literacy, scholarly communication process and pedagogical developments. Librarians are expected to continually do professional readings. Information and experience sharing sessions would have to be conducted as necessary and librarians would be encouraged to attend relevant training courses, especially those developed for faculty, to keep them updated on issues and new ideas in learning, teaching and research within the academic community.
2. A challenge to ensure that all library programmes offered are of quality and meet standards set and benchmarked. These programmes must also continually provide and add value to the learning and research experience as well as the knowledge acquisition of staff and students of the university. Standards, benchmarks and clear guidelines must be set to ensure continuing relevance and quality.
3. A challenge to convince faculty and students of the importance and need for information literacy programmes to be integrated into their course works and curricula. Champions of information literacy and collaborative partners for library instructional programmes need

to be identified in schools and administrative departments to provide support for such integration.

8. Conclusion

With the changing educational landscape, we are continually caught up in the race to be ahead. Demand for new resources to meet the needs of new and existing academic programmes and research in the university demands that the library work closely with students, faculty, research and administrative staff. The strategic approach which NTU Library has undertaken in recent years aims to make the library visible to the university community as a whole. The library has positioned itself visibly in the university's overall value chain with footholds to support academic and research programmes via collaborative and cooperative relationships with schools and departments in the university. The implementation of the information literacy programme is one such example.

The library is expanding the reach of its information literacy programmes to include all schools in the university, having now a working model that can be translated and implemented into the learning and research environment of these schools. In striving towards an information literate university, the mission to achieve is to explicitly embed the library's innovative information literacy programmes and activities into the curricula of many undergraduate and graduate programmes as the library is convinced that this will enhance students' learning and research as well as help the university produce more successful graduates and leaders for Singapore's educated citizenry.

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