INSTITUTIONAL ASSESSMENT OF STUDENT INFORMATION LITERACY ABILITY

A case study

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With increasing interest in the assessment of learning outcomes in higher education, stakeholders are demanding concrete evidence of student learning. This applies no less to information literacy outcomes, which have been adopted by many colleges and universities around the world. This article describes the experience of a university library in Hong Kong in administering a standardized test of information literacy - the Research Readiness Self-Assessment (RRSA) - at the institutional level to satisfy the need for evidence of learning. Compelling evidence was found of improvement in student information literacy ability over the course of their studies.

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INTRODUCTION

Information literacy is widely recognized as a crucial competency that is necessary for success in education and in lifelong learning, to the extent that it is frequently included as an expected learning outcome at postsecondary institutions and is increasingly being incorporated into institutional mission statements (Weiner, 2014, p. 5). Coupled with the rising demand for accountability among stakeholders in higher education, significant attention has been paid to the assessment of information literacy. At Hong Kong Baptist University (HKBU) Library, a concerted effort has been made over the past several years to administer a standardized test of information literacy at the institutional level. This paper describes how HKBU Library has administered information literacy assessments on a large scale and provides analysis of the data collected so far. It will also critically reflect on the approach taken and discuss possible future developments.

LITERATURE REVIEW

Widespread interest in the assessment of learning outcomes in higher education has been global trend in recent years. According to Douglass, Thomson, and Zhao (2012, p. 318), stakeholders increasingly see such assessment efforts "as a method to measure the value added, and to a large extent the quality and effectiveness, of colleges and universities." The essential premise is that institutions can use learning outcomes data to identify areas for improvement, and take appropriate measures to make such improvements a reality. Such data has also been used for accreditation and accountability (Liu, Bridgeman, & Adler,

2012). It should be noted, however, that the adoption of learning outcomes assessment has not been without challenges. Liu (2011, pp. 5-7) summarized some key concerns, including the fact that there is insufficient evidence of whether scores on outcomes tests actually predict student success after graduation. Nevertheless, outcomes assessment is now entrenched at many institutions, and there is strong demand for standardized tests that can produce evidence of student learning that is comparable between institutions.

This emphasis on the assessment of student learning outcomes has had an impact on academic libraries, particularly in the way they assess their teaching of information literacy. Oakleaf (2008, p. 233) noted that libraries formerly relied heavily on input, output, and process measures to provide evidence of excellence. For information literacy efforts, such indicators may have included the number of teaching librarians, the total number of classes taught by librarians, total attendance, etc. However, in an environment where outcomes-based measurement is heavily stressed, stakeholders are more concerned about what students have actually learned and what they are able to do following instruction. Accountability is especially crucial where information literacy has been integrated into the curriculum, and librarians need reliable and valid data on student learning outcomes in such cases (Cameron, Wise, & Lottridge, 2007, pp. 229-230). More generally, scholars in the library profession have noted the arguments made for evidence-based librarianship and the need for a "culture of assessment" within libraries (Walter, 2009, p.94). Efforts to meaningfully assess the information literacy ability of students can

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be viewed as an essential component of a holistic approach to library assessment. They also contribute to and align with institutional-level needs to assess student learning outcomes.

Standardized tests have been explored as one way to assess the learning of information literacy skills. These generally take the form of fixed-choice tests that are intended to be uniformly administered and scored. Oakleaf (2008, pp.236-237) summarized the benefits and limitations of such tests as follows:

Benefits
- Easy and inexpensive to score
- Collect a lot of data quickly
- Can be used to compare pre- and post-test
- Can be made highly reliable
- Can be used to compare groups of students
- Are widely accepted by administrators and the general public

Limitations
- Do not test higher-level thinking skills
- Include oversimplifications
- Reward guessing

It should be emphasized that such tests may be less effective in assessing learning than other approaches (e.g. portfolios, performance assessments, rubrics). Walsh (2009) also highlighted the fact that, by their nature, multiple-choice questions focus on lower-level skills. However, he also noted that with care such issues can be addressed, and that multiple-choice tests offer significant advantages in the collection of

data. Indeed they may be the only feasible means when attempting assessment at the institutional level. It has also been asserted that when such instruments are administered as a pre-test, they can add value to instruction by acting as a motivation for students to pay attention (Ivanitskaya, DuFord, Craig, & Casey, 2008, p. 254).

The past fifteen years have seen the development of several different standardized information literacy tests. Project SAILS is one of the best-known; created in 2000 at Kent State University, its creators also recognized the limitations of fixed-choice tests as described above, but decided that this format was most suitable to their goal of large-scale testing (Salem & Radcliff, 2006). The SAILS test proved to be popular, and by 2007 it was in use at 83 institutions (Lym, Grossman, Yannotta, & Talih, 2010). Other tests that have emerged include the Research Readiness Self-Assessment (RRSA) developed by Central Michigan University (Ivanitskaya, Laus, & Casey, 2004), the Information Literacy Test prepared at James Madison University (Cameron et al., 2007), and an unnamed assessment tool created at the University of Maryland (Mulherrin & Abdul-hamid, 2009). Although the author could find no comparative study of these tests in the literature, all of them make reference to the ACRL Information Literacy Competency Standards for Higher Education. The tests mentioned above have been rigorously assessed for reliability and validity, and can be considered useful tools for librarians in the assessment of their information literacy programs.

Despite the widespread availability and application of these tools, which have the

major advantage of being ideally suited for large-scale assessment at the institutional level, there are relatively few reports in the literature of standardized information literacy tests being used in this way. In their survey of libraries that had made use of Project SAILS, Lym et al. (2010, p. 182) noted that a significant majority used convenience sampling when administering the test. They speculate that this is the case because librarians primarily rely on their personal relationships with "library-friendly" faculty for access to students. This means that librarians can generally only administer tests to students enrolled in the courses of such faculty, which will often not be representative of the student body as a whole. Similarly, studies that have focused on the RRSA have also been restricted to small convenience samples (Ivanitskaya et al., 2008; Mathson & Lorenzen, 2008). The relative scarcity of studies making use of representative samples is a concern. As noted by Schilling and Applegate (2012) without systematic access to learners, it is impossible to implement rigorous research methodologies. There are some examples in the literature of standardized tests being administered to larger populations (Mulherrin & Abdul-hamid, 2009), but additional studies would further enrich our understanding of the utility of this form of information literacy assessment.

The present study seeks to make a contribution in this area by reporting on the results of a large-scale administration of the RRSA at HKBU designed as a pre- and post-test model using large samples representative of the undergraduate student body. As most previous studies have been undertaken in North America, the HKBU project may be of additional interest as a study of information literacy assessment in a Hong Kong Chinese cultural context.

BACKGROUND

HKBU is a relatively small government-funded university with roots as a liberal arts college. In September 2008, the University approved a set of Graduate Attributes that all students should attain by graduation. Information literacy was included among these attributes (Centre for Holistic Teaching and Learning, 2013). The University Library recognized that the inclusion of information literacy as a Graduate Attribute warranted an effort to gather evidence that this goal was being achieved, and that librarians were well-placed to take the lead. In 2010, the librarians examined the available standardized information literacy tests, and they determined that the Research Readiness Self-Assessment (RRSA) would best fit the needs of the Library and the University. Since 2011, the RRSA has been administered to all attendees of the Library's freshman orientation workshops. As attendance at this workshop is required by the University, the Library has been able to gather comprehensive baseline data on the information literacy skills of incoming students. In these administrations, freshmen students generally perform poorly, as might be expected of students who are new to higher education. While useful in demonstrating a clear need to support students in the development of their information literacy skills, the Library's intention with the RRSA from the start was to also administer the test to non-freshman undergraduate students. We wished to demonstrate improvement in this key competency by comparing the results with

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those of the freshman students. Such evidence of improved student information literacy skills was welcomed, given the emphasis placed on assessment by university administrators and by other external bodies.

Unfortunately, the Library lacks an opportunity akin to the freshman orientations that would allow it to comprehensively reach other undergraduates. An initial experiment in 2012 to have final year students complete the RRSA on a voluntary basis failed. The response rate was far too low, and within the convenience sample certain groups of students were conspicuously over-represented. Comparisons with freshman data were invalid, and no conclusions could be drawn. After reviewing possible options to obtain better data, the Library partnered with the University's Centre for Holistic Teaching and Learning (CHTL). As CHTL is also active in administering their own standardized student tests, the two units were well-positioned to collaborate. As a result, they worked together to administer a battery of standardized tests to a carefully-selected group of non-freshman undergraduate students in March 2013.

METHODOLOGY

The investigators decided to compare the results of freshman and second year students to provide evidence of continuous improvement in their information literacy abilities. A longitudinal approach was possible because the Library had already been administering the RRSA to incoming freshman students since 2011, and had comprehensive RRSA assessment data for the AY2011/12 cohort. At the time of the e-

assessment exercise in March 2013, these students were coming to the end of their second year of study. By retesting a sample of these second-year students, it was deemed possible to directly compare the progress of their information literacy abilities. Although the students were given an identical version of the test that they took as freshmen, the investigators were unconcerned that this would be a factor in their performance; 18 months had elapsed since the first administration, and students were unlikely to remember the test questions. Furthermore, students only received general feedback after completing the original RRSA; they did not receive answers to individual questions. As noted by Ivanitskaya et al. (2008), students' prior experience with the RRSA should not have a significant impact on their performance on the second administration.

Data was also gathered for third year undergraduate students. Since these students had begun their studies in 2010, no baseline data was available to determine their improvement since their freshman year. However, their inclusion was intended to provide some insight into how senior students performed, as compared to their younger counterparts.

As noted, the first administration took place during a required library orientation session for freshman students in August 2011. One hour was allotted for these sessions, including the completion of the RRSA. The test was given under standard examination conditions; students had to work on their own. Students who were not able to complete the RRSA in class were able to save their progress and were given a one-week deadline to complete it at home. The

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approach described here can be described as saturation sampling; an attempt was made to conduct a complete census of the population under study. Nevertheless, a 100% completion rate was not achieved, as there was never 100% attendance at the orientation sessions. In total, 1170 valid results were obtained from a total 1400 students. This 83% participation rate was considered very high.

The logistics of the second administration that took place in March 2013 were more challenging and would not have succeeded without the collaboration between the Library and CHTL. As there were no required Library sessions for non-freshman students to attend, and a voluntary approach was not feasible, the investigators decided to pay students for time spent completing the RRSA and other standardized tests. This was the only way to ensure a sufficient response rate. However, this approach could not be used to test the entire cohort for reasons of organizational and budgetary constraints. Instead, a sampling approach was used instead, and care was given to ensure that this did not introduce systemic biases: for example, the inclusion of a disproportionate percentage of high or low GPA students, which might have skewed the comparative results. To control for such biases, CHTL selected students for inclusion in the sample based on two criteria: – (1) the Faculty/School to which the student belonged, and (2) their cumulative GPA. This ensured that the students were representative of the entire cohort in terms of both disciplinary area and academic performance. As with the administration to first-year students, the test was taken under standard examination conditions.

RESULTS

A method of comparing each sample's ability to meet different performance cut-off points was employed for the purpose of assessing the overall performance of students taking the RRSA. The Library had previously used this approach to analyse the performance of freshman cohorts. The method involves determining the proportion of students that are able to achieve a certain percentage score on the objective right/wrong questions included in the RRSA (the RRSA also includes some attitudinal questions, which are not considered in the calculation of the score). For example, the figure for the 50% cut-off point shows the proportion of students in the sample who answered at least half of the objective questions correctly. This type of analysis has the benefit of progressively highlighting differences in performance that would not be readily apparent if we simply looked at the average scores for each cohort.

Table 1 presents the results of this analysis. To recap the description in the Methodology section above, there were three sets of results. The first set was for freshman students entering the University in 2011, where the RRSA was administered in August (2011 Freshmen). The second set was for a representative sample of this same group of students in 2013, with the test being taken in March (2013 2nd Year UG). The final set of results was obtained for third year students at the same March 2013 administration (2013 3rd Year UG).

As described, it has been HKBU Library's experience that freshmen students perform poorly on the RRSA. Although there is no defined "passing grade," a score of 70% on

TABLE 1—COMPARATIVE OVERALL PERFORMANCE OF STUDENTS ON THE RRSA AS FRESHMEN AND AS NON-FRESHMAN UNDERGRADUATES

Cut-off Point	2011 Freshmen (n=1170)	2013 2nd Year UG (n=193)	2013 3rd Year UG (n=177)
50%	84%	97%	96%
60%	48%	82%	87%
70%	16%	53%	63%
80%	3%	21%	31%

the assessment is regarded as an acceptable performance. As freshmen, a mere 16% of the cohort of students under study was able to achieve this level of performance. There was a clear improvement in their performance when they were tested again after 18 months, with over half of the 2013 2nd Year UG sample scoring at or above 70%. There were consistent levels of improvement at other cut-off points. Almost all 2nd Year UGs (97%) were able to achieve a score of at least 50%. Furthermore, one fifth of them met the 80% cut-off point, which is significant, given the negligible proportion that met this target as freshmen. While these findings are encouraging, it should be noted that the results also indicate that 47% of 3rd Year UGs did not meet the 70% cut-off point, and thus did not demonstrate an acceptable level of information literacy, perhaps suggesting that many students struggle with this particular skill set.

As a reminder, the 2013 3rd Year UG sample was made up of students who had never taken the RRSA before. Consequently, no comparisons can be made with their performance as freshmen. However, some cautious comparison can be made with the results of the other samples.

This cohort performed better than the 2013 2nd Year UG, but the difference was not substantial. It was not as big as the difference between the 2011 Freshmen and 2013 2nd Year UG. These observations are consistent with the HKBU context, where required Library information literacy workshops are concentrated in the first year of study.

The RRSA system can also provide detailed performance reports in the six key areas that make up the test; in addition to the overall performance, improvements in specific areas can be reviewed. These reports also include the results of the subjective questions included in the RRSA. Table 2 presents the results for the students tested in 2011 and 2013. It should be noted that the data collection method precluded separate results for the Year 2 and Year 3 students tested in 2013. Although this means that the results of the performance reports are less granular than the cut-off point analysis, a good picture of the improvement seen in non-freshman undergraduate students can still be presented.

The performance report also includes the data collected on the subjective components of the RRSA. While these results are not

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TABLE 2—COMPARATIVE PERFORMANCE OF FRESHMAN AND NON-FRESHMAN UNDERGRADUATES IN THE SIX RRSA CATEGORIES

RRSA Category	Maximum possible score	2011 Freshmen (n=1170)		2013 2nd and 3rd Year UG (n=388)		Change in performance		
		Mean score	Average percentage score	Mean score	Average percentage score	Change in percentage	Change in score	t-value
Categories measuring knowledge and skills (objective):								
Evaluating information	6	2.55	**42.50%**	3.62	**60.33%**	**+17.83%**	**+1.07**	**4.72*****
Obtaining information	28	17.57	**58.57%**	21.11	**70.37%**	**+11.80%**	**+3.54**	**1.97***
Understanding of plagiarism	14	9.34	**66.71%**	10.10	**72.14%**	**+5.43%**	**+0.76**	**0.53**
Categories measuring experience, attitudes, and beliefs (subjective):								
Reliance on free Internet browsing	50	26.87	**53.74%**	24.46	**48.92%**	**-4.82%**	**-2.41**	**1.67**
Perceived research skills	40	25.07	**62.68%**	25.44	**63.60%**	**+0.92%**	**+0.37**	**1.99***
Research and library experience	33	12.2	**36.97%**	16.55	**50.15%**	**+13.18%**	**+4.35**	**3.27*****

1. Readers will note that this figure is not consistent with those presented in Table 1 (193+177 = 370). This was due to 18 records not being included in the cut-off analysis for various reasons (e.g. final year students in a four-year programme were counted as 3rd Year UGs). These results unfortunately could not be excluded from the performance analysis, but given the small number of records the impact is minimal.
2. An independent sample t-test was performed using SPSS 20.
3. Note that in this category a **lower score** indicates **less reliance** on the free Internet for research.

relevant to the goal of assessing information literacy ability, they do provide broad insights into the attitude of HKBU students towards research. These can help librarians better tailor their instructional and service offerings to be more effective. Examining the subjective categories, the investigators observed a small drop in reliance on browsing the free Internet for research. Although students' perceptions of their own research ability remained relatively unchanged, there was a significant increase in their experience of research and library use. This finding is interesting, especially in the context of the improvements observed in the objective categories. It would appear that students do not feel more confident despite at research despite becoming more skilled. However, it could be argued that underestimating one's research ability is preferable to being overconfident, and students will be more likely to seek help when necessary.

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DISCUSSION

Librarians at HKBU were pleased to be able to provide evidence suggesting that the information literacy ability of students improves over the course of their studies. However, these results do not prove that the program of information literacy instruction provided by the Library is solely (or even mostly) responsible for the observed outcome. What can be tentatively claimed is that over the course of the first eighteen months of their HKBU experience, students exhibited observable improvements in their information literacy abilities. This experience will have included library workshops that are a required part of the curriculum, and other forms of instruction from librarians depending on their course work. Although the results here do not provide conclusive proof that this instruction was responsible for the improvement, it does indicate that the HKBU experience as a whole is effective in developing information literacy competencies. In the opinion of the author it can reasonably be claimed that library instruction is having the desired effect because the program is part of the students' experience specifically geared towards that development. For stronger evidence, an experiment with a control group of students that receive no instruction would be needed. This would be challenging or even impossible to implement at the institutional level at HKBU, as it would mean excluding specific students from required parts of the curriculum. In the absence of this option, the results presented here may represent the strongest evidence of the efficacy of library instruction that could practicably be gathered.

No approach to the complex task of institutional-level information literacy assessment will ever be perfect; there is room for improvement in the way that HKBU Library approached this challenge. One potential problem is the lack of real effort by students on low-stakes assessments. Since the RRSA score does not have any impact on students' GPA, they are likely not trying their best. Liu, Bridgeman, and Adler (2012, p. 352) noted that this "could seriously threaten the validity of the test scores and bring decisions based on the scores into question." Wise and Kong (2005) suggested identifying unmotivated students by looking for low response time effort: in other words, excluding students who finished the test too quickly to have reasonably devoted an appropriate amount of effort. The RRSA administrator interface does provide the time taken for completion, so it would be feasible to filter out the results of students that complete the assessment too quickly. However, this would potentially have an impact on the sample, making it less representative of the student population.

An additional concern is the extent to which the RRSA is a reliable and valid measure in the HKBU context. Although the RRSA was professionally developed by academics, Cameron et al. (2007) suggest that institutions adopting standardized tests developed by others should collect their own evidence of score reliability and validity. Other researchers have further argued that locally-designed assessment tools are the best way to meet an institution's needs and accurately identify areas for improvement (Staley, Branch, & Hewitt, 2010). This may be true, but many institutions simply lack the resources and

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expertise to be able to develop such tools themselves. Another possibility that HKBU librarians have discussed with the creators of the RRSA and other librarians in Hong Kong is the creation of a version of the RRSA specifically for Hong Kong students. This would address concerns that cultural differences might impact the performance of our students on the assessment. As of the time of this writing (September 2015), this project is moving ahead as part of a larger collaborative information literacy project between the eight government-funded universities in Hong Kong. It is hoped that this will be ready to administer in September 2016.

A broader concern is whether the RRSA itself is still a valid measure ten years on from its initial conception. Although it was designed to assess the ACRL *Information Literacy Competency Standards for Higher Education*, there is now debate within the profession as to whether these standards are still an adequate definition of information literacy. In February 2015, the ACRL voted to adopt a new *Framework for Information Literacy for Higher Education*. There was serious discussion around sun-setting the *Standards*, but this conversation was deferred indefinitely until it becomes clearer as to how the *Framework* develops (Williams, 2015). The *Standards* remain relevant for now, however this may change in the future. Widespread adoption of the *Framework* would present significant challenges for standardized tests of information literacy, as the *Framework* emphasises those higher-order abilities that are difficult to assess via fixed-choice tests. Looking forward, it is likely that HKBU's approach to institutional assessment will have to evolve along with the profession's

changing conceptions of what information literacy itself means.

Future efforts may also address Oakleaf's (2008, p. 237) critique that standardized tests lack authenticity and do a poor job of assessing higher order thinking skills. This would be particularly relevant in the context of the ACRL *Framework*. A possible approach might involve the use of standardized testing in conjunction with other forms of assessment that are recognized as reliable and valid assessments of higher order skills, such as portfolios or simulations. However, such methods tend to be significantly more time-consuming and intrusive compared to standardized tests (Walsh, 2009), and it would be challenging to integrate these methods into institutional-level assessments. Nevertheless, such avenues are being actively explored. For example, one of HKBU Library's instruction librarians is a member of a community of practice recently established by the University to explore the use of student e-portfolios.

Conclusion

Since 2010, HKBU Library has been making use of the RRSA to assess the information literacy ability of its students. From the beginning, institutional assessment was a key driver of this effort. The fact that several years of concerted effort were required is testament to the challenges and obstacles that such initiatives face. The data gathering and analysis process was not entirely smooth, and needs further refinement. Nevertheless, the Library has been able to collect some compelling evidence of improvement in a key Graduate Attribute, with non-freshman students

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scoring significantly higher on the assessment than freshman students. Such evidence is invaluable in helping show senior university management and other stakeholders the value of the library service. While the methodology used was not without flaws, it allowed for the large scale gathering of data. The Library intends to draw on its experience to make further improvements in future iterations of the exercise. It should be noted that this project would not have been possible without the collaboration between the Library and the University's Centre for Holistic Teaching and Learning. The librarians involved relied on CHTL's expertise in determining a truly representative sample, and the partnership made it easier to secure resources to support the exercise. Although not the focus of the present article, this highlights the importance of partnering with other key stakeholders on campus to ensure success in institutional-level endeavours.

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