JOURNAL OF MEDIA AND INFORMATION WARFARE

Centre For Media And Information Warfare Studies

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Outcome Based Education: A Computational Measurement On Special Librarian Intelligence Competency

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ABSTRACT

Information is the key driver for an organization to be able to make prudent decision and direct the organization effectively to meet their corporate objectives. With the advent of information technology and information systems, dissemination of knowledge, data, and information, has exploded by leaps and bounds. Librarians are now expected to conduct data mining, explore and analyze meta data, code and categorize knowledge, employing the most advance information management system as well as the best available technology. Now, they need to be equipped with specific competency to execute responsibilities vested on them. This has prompted the need to study Library and Information Management program offered by the Faculty of Information Management, Universiti Teknologi MARA, Malaysia (UiTM). The program was designed to develop competent Librarians; among others the graduate outcomes is to be Knowledge Managers, Information Innovator; etcetera, which are deemed Information Professionals (IP). This is explicitly described in the subject learning outcomes where technical knowledge and generic skills were identified using Bloom's Taxonomy. This paper presents a case study on special librarians who is required to carry out specific task in a highly specific environment. Result of computational measurement of course learning outcomes is mapped against job specification in the industry utilizing competencies attributes established from meta-analysis. It was noted that development of technology and expansion of current job scope demands a specific training for these special librarians.

Keywords: *Learning Outcomes, Special Librarians, Information Professionals, Competency, Performance Measurement.*

1. Introduction

Traditionally librarians are regarded as the gatekeepers of information. Time passed and users became dependent of information. Decision making are based on relevant and reliable information. The changing needs and increasing demand of users, the different structure of information and rapid changes in IT capability; it became apparent that librarian cannot avoid but to change their role to suit such fluid ambience. Now they must possess the knowledge, skills and relevant attitude to asssure user satisfaction in trying to obtain the required information speedily; and with lots of convenience.

Librarians responsibilities are no longer limited to the traditional library function but now requires specific knowledge and skills in other areas; namely, communication, management and organization's nature of business (Bender, 1998; Wiggins, 2001; Yamazaki, 2007). In specific organization, this competencies can be identified in the job scope for special librarians. They are responsible in handling specific information and controlled documents which shall determine the organization's success. Their role is no longer referred to as librarians but of Information Analyst, Information Navigator, Information Officer; etcetera; hence Information Professionals (IP).

One example of this role is the Security Officer in the Chief Government Security Office (CGSO). In CGSO information gathering is crucial; turning hear-say into factual information to be used and support critical decision making. Decision ranges from securing premises to preventing sabotage and espionage (History - CGSO, 2005). The information is vital for the security of the country; in this case, Malaysia.

They are required to gather information on incidents which might have potential threat to the country well being. These informations underwent tight scrutiny and filtration processes before consolidation to be used for policy making purposes and subsequently archived. Issues which are of high risks are then forwarded to other relevant authorities for onward actions. Their information organization must to be done fast as they are responsible in providing strategy in preventing saboteurs activities. Determination of the country protective security policy is dependant on the information accuracy. Hence, it demands a high intelligence competency in seeking accurate findings in the course of

information gathering as well as information organizers, archival and user in one.

These competencies; knowledge, skill and attitude, are industrial competency requirement, forms the basis for academic institutions to develop their programs in educating the future information professionals. This explained further why librarians or information professionals' competencies should be of prime focus and of utmost importance to librarian studies offered by the institutions of higher learning..

Many studies were done previously in the field of Librarians and Information Professionals competency including Malaysia. (Rahman, 2000, Zaiton, 2004, Zakiah, 2007). Each of those studies had identified different sets of competencies and few are common with each other. However, identification and assessment of these competencies among Librarians and IP's are done on the basis of simple mean and median statistical representation. As IP task gets more demanding, there is a need in establishing a measurement index which shall be reflective of each identified competency and the respective performance level. This will be the fundamentals used to establish the threshold value will serve as the benchmark of an IP competency.

2. Theoretical Framework

This calls for a perception study on the special librarians competency which can be conducted through self-assessment. This type of assessment is based on the Perception and Preference Inventory (PAPI) test which is used by the management team in executing performance measurement. PAPI assessment offers a 2x2 matrix questions style, building questions from a active style to a passive style questions as depicted in Table 1.

Table 1: PAPI style 2x2 matrix questions

Needs in belonging to groups	
Positive	**Negative**
High	**High**
Conscious of group attitudes and needs.	Overly concerned about group needs and exclusion of work needs.
Low	**Low**
Not easily swayed by group pressured.	Lacks sensitivity to group attitudes and needs.

The questions in this study will be formulated based on the identified dimensions and attributes established from literature survey in the area of library and IP competency. The meta-analysis comprises studies and guidelines prepared by Malaysian authority in librarianship naming few like Bakeri (2001), Zaiton (2004), Zakiah (2007), (*Garis Panduan Perpustakaan Khusus, 2001; Laporan program latihan khas untuk pustakawan,* 2002), and (Perubahan skim perkhidmatan pustakawan, 2005).

It includes few studies done on librarian and IP in Malaysia done by Rehman (2000), Al-Hawamdeh (2001), and Abdoulaye (2001). The study includes also guidelines prepared by international professional bodies especially in library and information area such as the Special Library Association (SLA) (Marshall, Fisher, Moultan, & Piccoli, 1996) and the sequel revised version (Abels, Jones, Latham, Magnoni, & Marshall, 2003). The specified competencies were tabulated in matrix form and categorized according to common keywords termed dimensions for meta-analysis.

The study adopts Bloom's taxonomy and PAPI's categorization of skill and knowledge because IP requires more than knowledge and skills in their specific field of information but also requires skills to perform management responsibilities (Abdullah, 2001; Bender, 1998; Kirk, 1999; Loughridge, 1999; Yamazaki, 2007). The librarian especially special librarians are responsible in providing the relevant and significant information for decision making of the organization. This factual information is required in ensuring the organization success.

3. Instrumentation

The consolidated list of necessary skills and knowledge required for librarians and IP serves as basis in formulating the questionnaire. Questions are composed on a positive and negative style statement to avoid bias response from respondent (*Kostick PAPI*, 1995). It adopts the keywords used by ABET (Al-Bahi, 2007) in assessing intelligent competencies, generic skill and their related behavior.

The respondents, sample from government special librarians with grade S41 and above, will be asked to rate their competencies based on a modified dichotomous rated scale from **1** to **4**.

4. Computational Methodology

The competency attributes undergone face-validity test by identified prominent IP. Face-validity process ranks the attributes according to priorities; a 1 Major, 2 Mediocre and 3 Minor. The attributes will then be transformed into Blooms Taxonomy (Besterfield-Sacre et al., 2000) categorization by using ABET method and applying the inverse diminishing scale to Major, $1/2^0 = 1$; Mediocre, $1/2^1 = 0.5$ and Minor $1/2^2 = 0.25$. See Table 2.

The responses obtain from the questionnaire which are of rank data, does not possess an interval scale but rather of continuum type. Hence, evaluation using the raw score is rather complex to be carried out. Raw score has the limitation of telling exactly the extend of skill development. A librarian who scores 80% cannot be deduced to be twice as smart as another librarian who scores only 40%. The raw data cannot classify respondents into the correct ability group for remedial measures.

Table 2 : Transformation of Attributes into Bloom's.

TABLE OF TEST SPECIFICATION								
Training: XXX YYY								Date: ddmmyy
Topics	M	BLOOM'S TAXONOMY						W%
		BT1	BT2	BT3	BT4	BT5	BT6	
Topic A								
Sub-topicA1		3	2					
Sub-topicA2			1			2		45
Sub-topicA$_n$			1	2				
Topic B								
Sub-topicB1				2	2			55
Sub-topicB2			2	1				
Sub-topicB$_n$			1		2			
QUESTION SPREAD %		15	35	25	15	10	-	100

However, by applying Rasch Model, all the error in measurement is absorbed by using the 'logit' as the measurement unit thus transforms the assessment results into a more accurate linear correlation, thus giving a predictive indicator on a scale for a librarian. The data will be analyzed for reliability using Person and Item reliability measure including Rasch Separation Index – **G** and Item Characteristic Curves Discrimination Index '**a**' for construct validity.

Table 3 shows the simple computation of an assessment. Let us assume, the skills to be assessed are **BT2** - Understanding and **BT3** - Application.

Next each attribute is given a grade. In this exhibit, the grade of attributes in Dimension A – **BT2** is totaled up:

$$\text{Attribute A}_n = 2+3+4 = 9 \qquad (1)$$

The sum of the grades is then averaged out; to give,

$$\textbf{BT2} \text{ average score,} = 3 \qquad (2)$$

This raw average score; $BT2_{avs}=3$ is adjusted by multiplying **W**, weightage to

give the true score for the said dimension;

$$\mathbf{BT2}_{tS} , \mathbf{W*G} = 0.4 \times 3 = 1.2 \qquad (3)$$

Finally, each Dimension score is summed up to give the true score the student obtained for his / her assignment;

$$\text{Sum } (\mathbf{W*G}) = (0.4 \times 3) + (0.6 \times 3) \qquad (4)$$
$$= 1.2 + 1.8$$
$$= 3.0$$

Table 3 : Simulated Assessment

PERFORMANCE SCORE FORM						
Respondent XXX YYY					Date: ddmmyy	
Ratings	W	GRADE				W*G
		1	2	3	4	
Dimension A- BT2	40					0.4x3=1.2
Attribute A1			_/			Ave.S =
Attribute A2				_/		2+3+4
Attribute An					_/	3
						= 3
Dimension B - BT3	60					0.6x3=1.8
Attribute B1			_/			Ave.S =
Attribute B2				_/		2+3+4
Attribute Bn					_/	3
						= 3
Sum (W*G)						1.2+1.8 = 3.0

This true score is more reflective of a librarin's skill achievement rather than an arbitrarily assessed. Now we can pin-point exactly the finite attribute and the respective BTN can be assessed.

Table 4 shows a further simulated computation to establish the competency index of the attributes; CIPi. Let us assume the total number

of special librarian with grade salary S41 and above is 100, hence, N of the population surveyed; N=100. Imagine, the spread of N for each attribute given the score S1-4 is;

Attribute A1, N: 15, 30, 35 and 20
Attribute A2, N: 25, 40, 25 and 10; etc.

Next, this value of *N* is multiplied to each respective score;

$$15 \times 1 = 15, 30 \times 2 = 60, 35 \times 3 = 105, 20 \times 4 = 80 \qquad (5)$$

This gives a total sum scored of ;

$$15 + 60 + 105 + 80 = 260 \qquad (6)$$

Table 4 : Computation of Competency Index; IPi

COMPETENCY INDEX ANALYSIS						
Respondent: XXX YYY					Date: ddmmyy	
Ratings	1	2	3	4	$\overline{x}$	
Dimension A-BT2						
Number of N	15	30	35	20	100	
Attribute A$_1$					$\dfrac{260}{100}$	
	15	60	105	80		0.65
Score Obtained					=2.40	
Number of N	15	30	35	20	100	
Attribute A$_1$					$\dfrac{220}{100}$	
	25	80	75	40		0.55
Score Obtained					=2.20	
			LO Mean, $\overline{x}_i$		$\dfrac{2.40+2.20}{2} = 2.3$	
		BT2-CIPi : Competency Score			$\dfrac{2.30 \times 100}{4}$ = 57.50%	

The total sum scored for Attribute A1,N=100 =400, is then moderated against the full score in an ideal scenario when everybody is assumed to be totally excellent.;

$$= 0.65 \tag{7}$$

The mean value for this particular attribute is obtained by multiplying this value of 0.65 to the expected full score of 4 to proportionately yield a value of 2.40.

This process is repeated for all the other attributes to give each mean value of;

$$\frac{\text{Sum of x}}{\text{Total number of attributes}}$$

$$= 2.30 \tag{8}$$

Next, proportionate the result by 4, being the full score, to obtain the competency of that attribute's score, CIPi is;

$$\frac{230 \ \text{x} \ 100}{4} = 57.50\% \tag{9}$$

Now the librarian's competencies achievements can be tabulated. An illustrated competencies result is shown in Table 5. Competency achieved by each respondent for each attribute can therefore be dissected.

This is where assessment by skilled based is more useful. If we set 70% as the threshold of competency, then IP-D is having a problem. The librarian has problem developing skill BT3 and BT5.

Table 5 : Competencies Tabulation

TABULATION OF COMPETENCIES						
Training Title XXX YYY						Date: ddmmyy
Students	Learnings Outcomes Score					Marks
	BT1	BT2	BT3	BT4	BT5	BT6	
1. Azrilah	86	92	88	80	78	81	**84**
2. Sohaimi	82	84	78	82	74	72	**76**
3. Saifudin	80	82	76	80	80	70	**73**

4. IP-D	77	76	72	68	66	68	**72**
5. IP-E	81	72	68	72	76	74	**72**
6. IP-F	76	74	68	70	66	72	**63**
7. IP-G	73	72	64	72	70	70	**62**
8. IP-H	78	71	63	71	64	71	**60**
Competency mean	79	78	72	74	72	72	

5. Discussion

A comprehensive pro-forma evaluation for the required competencies by dimensions and attributes can be prepared to meet industrial expectation. Librarians' competency is indexed as an indicator for each attributes using Rasch Model.

In this case Rasch Measurement can be simplified as (Uekawa, 2007);

Probability of	IP"S	Diffivulti
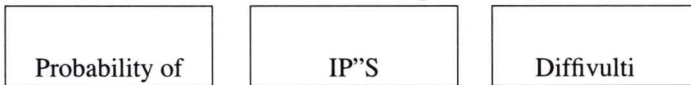
Rasch Model enable each of the librarians' ability; thus librarians' skill development to be clearly identified by each competency trait. Symptoms can be traced more effectively and treated specifically. This will help guide the management team to respond with certainty on the nature of corrective actions to be taken. A systematic and structured training can be established to avoid wastage and on the other hand gain competent librarian; thus, successful organization. The model if tested valid in measuring the special librarians' competency than it is valid in measuring IP competency, since special librarians is a sub-set of IP.

CGSO has developed a series of training based on the identification of specific skill shortfalls as required of an IP. A parallel study revealed there is an increase of awareness and competency level in CGSO IP staff and their cadres in other government agencies, subsequent to the training given. This is a positive indication that structured training with clear objective aligned with competent IP.

6. Conclusion And Recommendation

This simple yet prudent conceptual theoretical framework suggested a more comprehensive view but specific and objective evaluation. Rasch Model is capable in examining and put forward the determinants of competent IP. The Rasch model enables the attributes in each dimension to be further evaluated discretely. Factor analysis can be done on the IP competency index. This will give insight into the factors or attributes in each dimension affecting the performance of IP (Azrilah & Sohaimi, 2006). The significant differences between two independent samples can also be tested. These analyses shall be delved further in subsequent research.

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