Introduction

This paper reports the results of PhD research into the future needs of library professionals for education in the digital era with special consideration to the needs of the Hong Kong Special Administrative Region (SAR), Peoples Republic of China (PRC). The research method used was a Delphi study and representatives from China, Taiwan, Hong Kong, Macau, Singapore and the United States were chosen as participants in the study. This paper outlines the special features of this method and why it was selected, how it was implemented and initial findings from the study.

The research attempted to identify an ideal curriculum especially for use in the Hong Kong SAR, China, but also for consideration in other areas of South East Asia. It was conducted using the Delphi technique which is based upon the premise that a decision made by a group is more reliable and thus more desirable than a decision made by an individual.

Research Method: Delphi Technique

Delphi History and application

The Delphi technique is designed to obtain opinions from a panel of experts in a given subject field. The opinions are resubmitted a number of times (‘rounds’) until a satisfactory consensus is reached. The experts receive each others’ continuous opinions but the members of the panel are not known to each other during the survey. The basic idea is that joint judgement of experts is a relevant measure of what is to come.

The Delphi technique was first developed in the 1950’s by Olaf Helmer and Norman Dalkey, scientists with the Rand Corporation, and named after the greatest of all Greek Oracles. Dalkey and Helmer (1963) in a US Air Force sponsored study, asked seven experts of their opinion of the effects of strategic bombing of industrial sites in the US during a hypothetical conflict with the Soviet Union in 1953.

These founders of the Delphi method, Dalkey and Helmer (1963), have identified the following about Delphi:

- The Delphi technique is a procedure to solicit opinion, judgement, and consensus from a group of experts.
- It is a long-range forecasting method of aggregating the forecasts of experts on multidisciplinary issues.
- It is an interactive process for soliciting and collating opinions on a particular topic, through a set of carefully designed sequential questionnaires interspersed with a summarized feedback of opinions derived from earlier responses.

In a later study, ‘Delphi and participatory planning’, Cary and Solmon (1976) identify that Delphi has more roles to play as a research method. The results of the study show the focusing effect of the Delphi as a tool for discovering agreement and identifying differences, rather than forcing a consensus, or being an important tool of opinion change. Delphi’s major value is seen as a communication tech-
nique to increase the accuracy in perceiving others’ point of view and in producing greater understanding.

**Delphi as a forecasting method**

There are basically three approaches to the field of forecasting using Delphi:

- **Explorative methods** - Based on data about the past and present, phenomena (the use of time series analysis, model construction, Delphi, to build scenarios)
- **Normative methods** – A future situation is described and the changes necessary for the occurrence of this situation are deduced (the use of network planning, decision theory, Delphi).
- **Intuitive methods** – Contributions based on experts’ knowledge and experience are used for collecting estimates about future development (the use of brainstorming, Delphi method)

The original Delphi (classic form) is exploratory. It seeks to develop a picture of the future as it is expected to be. A variation of the Delphi technique (Normative Delphi) in this study has been used in which:

a. There is a distinction between questions of likelihood of occurrence and of desirability, and
b. The collection of judgement of timing for future events is a general period (21st Century) rather than a single date.

Normative Delphi was chosen because, unlike classic Delphi, the emphasis was on what the participants thought were desirable, rather than what they thought was probable. The normative Delphi is designed to facilitate a goal formulation, to establish the shape of the future that is desired, not to predict the shape of the future that will be. Since the consequence of an application of normative Delphi, is a systematic attempt to shape the future in the direction of the desired goals, a specific date for realization is therefore not a primary concern. This study is an attempt to shape the future library and information science curriculum in the direction of desired goals for 21st Century LIS education in Hong Kong, SAR PRC. The researcher was interested in discovering agreement among participants and identifying differences not trying to force a consensus.

A Delphi approach can be useful wherever:

- a problem does not lend itself to precise analytical techniques but where collective, subjective judgements may be valuable.
- individuals contributing to an issue may have a very diverse set of backgrounds, experiences and/or expertise,
- more individuals need to be consulted than can effectively meet face to face,
- cost inhibits frequent group meetings
- disagreements between individuals may limit the usefulness of the study.

Some problems of the Delphi method (Williamson 2003) can be identified as:

1. The value of the results depends on the competence of the panellists. The quality of a Delphi study is heavily dependent upon the reaction of a panel of experts; this panel has the potential to be too homogeneous or like-minded, thus producing skewed data.
2. The ‘top’ experts may be difficult to recruit.
3. A Delphi study requires a considerable amount of time and can be slow and time consuming to complete.
4. The respondents may drop out if they are not strongly motivated.
5. The researcher, or the respondents themselves, may misunderstand the written inputs of panel members; communication problem, if they occur, may be difficult to resolve.

**Steps in Delphi Studies**

Two main rounds or steps in carrying out a Delphi study can be identified. Step one in Delphi studies is the selection of initial statements and topics while Step two involves selection of a panel of experts.

**Step one: Selection of statements and topics**

The initial statements and topics for the study were drawn from:

- a document analysis of the literature on existing library and information management programmes,
- discussions on core curricula, and
- forecasts for personnel demand in the area.
Document analysis

Document analysis of the literature on existing library and information progress included the course descriptions from the ‘Departments of Library and Information Studies’ in a number of South East Asian countries including China (Beijing University, Wuhan University, Beijing Normal University, Nanjing University, Zhongshan University, Szechuan University), Singapore (Nanyang Technological University) and Taiwan (Taiwan National University).

Two universities in the United States (University of California, Berkeley and University of Michigan) were also included because of a recent revamped curriculum which paid special attention to future needs.

In addition the course descriptions from Charles Sturt University, Australia was chosen because of the long association that University has had with the School of Professional and Continuing Education, University of Hong Kong teaching an enhanced tutorial/distance education course in Hong Kong.

Core curricula discussions

Information on Core Curriculum discussion was collected from:

- Thesis, articles and reports on competencies skills required by the information professionals.

Personnel demand forecasts

Information on personnel demand forecasting was collected from reports sponsored by the relevant governments, library associations and from feature articles on the subject (see for example the Kaliper Report (2000).

Step two: Selection of a panel of experts

In keeping with the intent of Delphi studies purposive sampling was used to choose a panel of experts, who were known for their expertise in the area of library and information management.

Participants were sought who had the power to implement the findings of the study, possessed a high level of knowledge with expertise in library and information management education, were representatives of professionals in the field and were available to serve on the panel. Three categories of participants were identified belonging to one of the following: library and information science practitioners, library and information science educators and potential employers and user community of library and information science graduates. The selection of participants for the first two categories was taken from Mainland China, Taiwan, Hong Kong, Macau, Singapore and the United States while for the final category participants were only from Hong Kong.

Library and information science practitioners

There were 19 practising librarians who served as experts in this study (2 National, 5 Academic, 4 Public and 8 Special). All except one from the US were from Mainland China, Hong Kong, Taiwan and Macau. The US expert had long professional experience with considerable experience in South East Asia. Experts from China and Hong Kong were Chief Librarians from several academic, public and research/special libraries.

Library and information science educators

There were 8 experienced information science educators serving as experts in this study from Taiwan, China and Hong Kong.

Potential employers and user community of library and information science graduates

There were 11 experts from Hong Kong in this category representing the Hong Kong Library Association and special libraries.

Some dropout is usual in Delphi studies. In this study, there was a reduction from 38 participants in Round One to 32 participants in Round Two. The impact of the six dropouts is insignificant to the basis of the categories chosen as the dropout is evenly distributed (3 practitioners, 2 potential employers/user community, 1 educator)
Implementation of the Study

Relevant document analysis was carried out (e.g., existing LIS course descriptions, articles on core curricular discussions, and personnel demand forecasts) and analysed. The information collected was categorized into 14 topics and used as the basis of the statements used in this study:

1. Information technology skills (9 subjects)
2. System Design (4 subjects)
3. Information Services Organizing Skills (9 subjects)
4. Information Services Skills (9 subjects)
5. Value-added Information Analysis (10 subjects)
6. Collection Development Skills (7 subjects)
7. Services Skills for Special Population (9 subjects)
8. Subject Knowledge (10 subjects)
9. Archiving, Preservation and Conservation (6 subjects)
10. Research and Analytical Skills (4 subjects)
11. Communication Skills (7 subjects)
12. Management Skills (8 subjects)
13. Personal Qualities Requirement (6 subjects)
14. Study Mode (9 subjects)

Round One

Initially fourteen topics covering some 114 questions were presented to 38 participants in the first of two rounds to react to a series of statements relating to library and information management education. The experts received each other’s continuous opinions but the members of the panel were not known to each other during the survey.

Round two

In the second round some 32 participants responded. In the questionnaire the same questions with minor modification as suggested from the response of first round participants organised in the same structure was sent to all participants in the group. This was done to maintain a systematic approach and prevent bias towards participant’s opinions.

Consensus

Consensus in this study was achieved after two rounds where consensus was defined as at least 75% of experts agreeing on the same rating value for a given statement.

Data Analysis

Data Analysis for research findings was achieved through:

1. Identification of the important subjects and topics for LIS education from Round 2 using ISCORE (Information score) calculation and ranking. ISCORE is a measurement device designed by the researcher to compare the importance of ‘subjects’. The calculation of the Importance Score is based on the response to the criteria ‘Degree of expertise required for the profession’.
2. Identification of the subjects that experts have consistent views about in both Round 1 and Round 2 using the “Stability” criteria established by Scheibe, Skutsch and Schofer (1975).
3. Identification of subjects which have more effect on the overall topics through interaction within the topic. This ranking within the topics is worked out by maximising the correlation between the subjects within the topics using the method of Principle Component Analysis (PCA).
4. Identification of the ideal curriculum for library and information science education through further analysis of results obtained from findings in 1,2,3 above by a series of statistical analysis processes further shown below:
   A. Identifying which are the subjects that
      - Have a high mean ISCORE and
      - Are stable (have less than 15% change in Round 1 and Round 2)
B. Identifying subjects which are important within the topics (PCA analysis) and equally stable between Round 1 and Round 2 (Stability measurements of <15% of change) which satisfies the following criteria:
- List out subjects within topics which are important through PCA analysis
- Subjects within the above list which are stable.

C. Identifying which are the topics (in ranking order) which satisfy the following criteria:
- Topics that have high ISCORE
- Topics that are stable (less than 15% change)

D. Ranking and identifying topics that satisfy both high average ISCORE and high average stability.

The process can be identified as follows:

i. Rank each topic by Topic Mean ISCORE with the highest Topic Mean ISCORE being ranked first.
ii. Rank each topic by Topic Average Stability with the lowest Topic Average Stability being ranked first because lower value of topics average stability means more stability.
iii. Calculate sums of rank (1) & (2) above.
iv. Sort the result of (3) above in ascending order.

It was found after data analysis that appropriate curriculum content was concentrated in areas with the following priority: Research and analytical skills, information services skills, communication skills, management skills, collection development skills, subject knowledge, information services organizing skills, archiving, preservation and conservation services, skills for special population, information technology skills, system design, value-added information analysis.

Key results of the study (sorted by total rank)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Topic Name</th>
<th>Topic Mean ISCORE</th>
<th>Topic Mean ISCORE Rank</th>
<th>Topic Average Stability (%)</th>
<th>Topic Average Stability Rank</th>
<th>Total Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Research and analytical skills</td>
<td>8.21</td>
<td>4</td>
<td>11.35</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Information services skills</td>
<td>9.44</td>
<td>1</td>
<td>13.67</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>Communication skills</td>
<td>7.15</td>
<td>5</td>
<td>12.41</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>13</td>
<td>Management skills</td>
<td>6.50</td>
<td>7</td>
<td>13.72</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Collection development skills</td>
<td>9.21</td>
<td>2</td>
<td>15.88</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>8</td>
<td>Subject knowledge</td>
<td>4.92</td>
<td>10</td>
<td>13.08</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Information services organizing skills</td>
<td>9.10</td>
<td>3</td>
<td>16.01</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>9</td>
<td>Archiving, Preservation and Conservation</td>
<td>5.23</td>
<td>9</td>
<td>14.80</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>7</td>
<td>Services skills for special population</td>
<td>4.31</td>
<td>11</td>
<td>14.11</td>
<td>6</td>
<td>17</td>
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<tr>
<td>1</td>
<td>Information technology skills</td>
<td>6.31</td>
<td>8</td>
<td>15.86</td>
<td>9</td>
<td>17</td>
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<tr>
<td>2</td>
<td>System design</td>
<td>6.92</td>
<td>6</td>
<td>32.57</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Perform value-added information analysis</td>
<td>4.27</td>
<td>12</td>
<td>15.20</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Secondary results of the study: Personal qualities

It was also found in this study that the following personal qualities (prioritised) are required of an information professional:
- Have a mind set of willingness to learn and continue to learn
- Flexibility, Creativity, Innovation, Change
- Awareness of wider issues – professional
- Personal qualities (attitudes & aptitudes) to become an effective information professional
- Ability to Conceptualize
- Be people oriented, in a collaborative, partnership sense, where everybody learns from each other and participates in teams.
Conclusions

The reliability and validity of the findings is very much dependent on the research methodology and data analysis method. This piece of research is based on sound methodology and rigorous analysis of data. The findings somewhat deviate from the traditional thinking of the content of the core curriculum in LIS education. Traditionally, we have tended to think that the core-curriculum should be the LIS subject discipline itself, such as reference resources, cataloguing and classification, library services for special populations, and more recently, an emphasis on knowledge of IT and its applications.

The finding of this research, however, shows that Research and analytical skills is a little more than equal in importance to Information Services Skills as required by the profession. Equally true is that Communication and Management Skills is a more important requirement than Collection Development Skills. This is followed by Subject Knowledge, Information Services Organizing Skills, Archiving, Preservation and Conservation, Service Skills for Special Population in that order. Information Technology Skills, System Design and Value-added Information Analysis became the last 3 in the priority list. The grouping and the priority order of the courses is not as expected in the traditional thinking.

The message received from this research is that ideal LIS core-curriculum for the 21st Century should be organized broadly in 3 areas with the following order of preference:
1. Information Services skills, together with Research and Analytical Skills
2. Communication and Management Skills
3. Collection Development skills and Subject Knowledge

This is followed by elective courses such as:
4. Information Services Organizing Skills
5. Archives, Preservation & Conservation
6. Services Skills for Special Population
7. Information technology skills and systems design
8. Value-added Information Analysis

References

Williamson, K. (2003), The Delphi method, in Research methods for students and professionals: information management and systems, Centre for Information studies, Charles Sturt University: Wagga Wagga, NSW.