

# Statistics is a Necessary Part of a Well Balanced Professional Education

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## Abstract

A case is argued for the necessity for information professionals to possess a basic understanding of statistics. A study was undertaken for IFLA into the teaching of statistics in ILS schools in a number of countries. The findings indicate that most schools do not, apparently, now include a course, module or unit on statistics. The implication of this for the development of future managers and researchers is discussed. The role and requirements of accrediting and professional associations are reviewed. Proposals are outlined for ways to overcome this deficiency in the preparation for a professional career.

## Introduction

This paper serves as an introduction to the IFLA satellite preconference. It emerges from an investigation into the teaching of both management and statistics in a number of information and library schools. The findings give rise for some cause for concern and, it is suggested, there is an urgent need for action to be taken. Five points concerning statistics and professional education are discussed:

- the outcome of a project which examined the teaching of statistics within information and library studies courses at the qualifying level;
- some possible explanations for the current situation;
- the implications of this for the future management of services, and the development of a cadre of well equipped research workers;
- the role of professional associations and accrediting bodies; and
- some remedies for consideration by the IFLA Section on Statistics.

## Gathering the evidence – genesis and methods

All research projects start with a literature search, since the investigator hopes that someone has already written the seminal

paper on the subject. However, in the case of this project, a search for information and comment about current practice revealed very little. In fact only one recent paper was retrieved – by Niels Ole Pors (2000) who described the teaching of statistics at the Royal School of Library and Information Science in Denmark. This apparent lack of interest did not, on the one hand, provide a very promising start in terms of retrieving relevant information, but on the other hand, might be an indicator that the subject needed investigation.

The investigation had its origins when the topic emerged at the IFLA conference held in 2000 as one of two similar projects surfacing from two Sections within the Division of Management and Technology. Those experienced in the ways of committee work during IFLA conferences know that there is often little time for consultation between Sections before requests for funding are submitted to the Division's Co-ordinating Board – and the requests always far outweigh the funding available. On this occasion the Section on Management and Marketing and the Section on Statistics wanted to gather information concerning the way in which their subject was being taught in the ILS schools. The Chair of the Co-ordinating Board decided to bring the two projects together.

It had originally been anticipated that a full-scale survey would be carried out using a questionnaire, but funding was not available to support this depth of enquiry. So limitations were placed on the project. One limitation was to gather evidence by means of a content analysis of the websites of information and library schools since many carry detailed information about their programs – the curriculum, syllabi of courses or modules, and occasionally outlines and reading lists. Some websites were naturally in languages other than English and beyond the capability of the investigator to translate and this became a second limitation. The final sample yielded 82 ILS schools in Australia, Canada, New Zealand, the UK and the US and, of these, 78 websites were successfully accessed. (One side comment is that the websites were of variable efficiency and effectiveness for this investigation. The websites that yielded the greatest amount of relevant information most speedily were those of the older universities in each country. Those of the newer universities appeared to be more concerned with selling their courses rather than describing the products they had to offer. Readers might care to examine the websites of their organisations with an objective eye.)

The information was gathered in December 2000.

### **Nomenclature**

At the outset it is necessary to define the terms used in reporting the investigation. It can be confusing to the reader when describing the provision of professional education – even in the English language – and so this requires clarification. The terms adopted in this paper are those commonly used in England.

A course in England consists of a number of modules, some of which are core and others may be optional. In North America the related terms are a program comprising required and optional courses. In Australia

the modules are commonly called compulsory and optional units.

### **The curricula of the information and library studies schools**

In looking across the curricula of the five countries it must be borne in mind that there are significant differences between the framework of professional education in each of the countries. This will significantly influence the content of courses.

In the US qualifying courses are offered at the postgraduate level and are of the equivalent of one year's duration, and that is also the pattern in New Zealand. In Australia and the UK qualifying courses can be offered at two different levels of entry. They may be a three or four year undergraduate, or a one-year postgraduate course. Canada has the most satisfactory provision requiring a two-year postgraduate preparation for a professional career.

### **The requirements of accrediting bodies**

The accrediting bodies, and those responsible for the quality of courses, influence the content of the curriculum. The accrediting body for each country, at the time when the investigation was carried out, was the national professional association.

- The Australian Library and Information Association does not refer specifically to statistics in its requirements for curriculum content, but states that students should develop knowledge and skills in ... “*Evaluation, involving measurement and judgement ...*” (ALIA, 1996).
- The American Library Association standards refer to “*analysis, interpretation, evaluation ...*” (American Library Association, 1993).
- The joint requirements of the Library Association and the Institute of Information Scientists (now the Chartered Institute of Library and Information Professionals – CILIP)

include numeracy listed under the heading of management and transferable skills (Library Association, 1998).

There is a second body in the UK that has an influence on course content, since it benchmarks courses in higher education. The Quality Assurance Agency has a wider remit than the accrediting bodies. It has adopted a peer review approach and examines general transferable skills, teaching methods and assessment in addition to the content of the curriculum. In terms of the core elements of the ILS field it requires *“The application of techniques for planning, implementing, evaluation and developing ... services and systems”* (Quality Assurance Agency for Higher Education, 2000).

#### **The aims of the courses**

There is a variation in the aims of courses, and this could affect the content. In general, the Australian schools provide an introduction to professional practice. In Canada four schools focus on essential theory and practice, with two indicating they prepare graduates for positions of responsibility or leadership. The majority of the UK schools focus on entry to the profession, with others offering preparation for leadership, a challenging academic experience, or a high level education for theory and practice. Of the US schools 38 offer an introduction, or equip graduates for entry, to the profession. Six offer preparation to become leaders or hold a position of responsibility.

#### **The findings**

##### **Statistics as part of the core or as an optional module**

None of the postgraduate qualifying courses that were examined contained a module which indicated that it focused solely on statistics. However, a number of schools teach statistics as an element of research methods, and so where the term ‘statistics’ appeared in a title of a module it was as ‘Research methods and statistics’.

Nearly half of the ILS schools (35 of 78) included a core or required module in research methods, and a further 22 offered an option devoted to research methods.

There are several reasons why there might be a variation in the inclusion of research methods in a postgraduate first qualification programme. One is that undergraduate courses which require the preparation of a dissertation would include research methods, and hence it might be assumed that education at the undergraduate level ensures that graduates are numerate. A second reason is that the postgraduate qualifying course concentrates on basic professional knowledge and skills.

In Australia certain universities have two levels of postgraduate education in the vocational fields. After the completion of a taught course lasting for the equivalent of one academic year and covering basic professional skills and knowledge, a Graduate Diploma is awarded. At the second level the completion of a dissertation is generally the requirement for the award of a master’s degree, and a module in research methods is taken before commencing the dissertation.

##### **Syllabus for statistics included in a core or required module**

A number of schools indicated the content of their Research Methods modules. The majority described the syllabus as providing an introduction to the nature of research, methods and techniques. Lecturers having a strong grounding in statistics who were then able to provide a greater depth in their teaching were apparently teaching some modules.

Research Methods is an example of a module that has come under pressure in recent years in terms of an expanding course content and changes in approaches to the subject itself. In terms of the expanding content, we are all very much aware of the impact of information and communications

technologies on professional practice and for the need for it to be given adequate coverage in ILS education. In terms of changing approaches to research, in the 1970s the common methods employed in the discipline involved the use of statistical techniques in carrying out rigorous surveys. This was extended when bibliometrics and citation analysis were introduced in the same decade. With the emergence of statistical packages for computer analysis, it was perhaps felt that the need for grounding in statistics was less important, particularly given the growing interest in qualitative techniques. Since the length of courses has remained constant over time, then the element devoted to statistics has declined. It may also result from the report difficulties that students encountered because they found the subject difficult to grasp (Durrance, 1980; Beattie, 1989).

**Table 1 Frequency of occurrence of topics in core and optional Research Methods modules.**

Topic	Frequency of occurrence
Introduction to research methods	36
Basic statistics	8
Descriptive statistics	3
Inferential statistics	2
Regression	2
Computational techniques	1
Correlation	1
Excel	1
Goodness of fit	1
Measures of dispersion	1
Sampling	1
Tests of significance	1

A range of textbooks was listed in the module outlines. Two schools were using Babbie's *The Practice of Social Research*, and others included Leedy and Ellis *Practical Research*, Neuman *Social Research Methods*, Katzer et al *Evaluating Information*, Williams *Reasoning with Statistics*, and "recommended for the mathophobic" – Brown, et al *Statistical*

*Concepts*. No lecturer appeared to be recommending the titles published by the national library associations.

Where teaching methods were indicated they consisted of lectures, demonstrations, discussion and group presentations. Most of the courses required students to prepare a critique of a research report and/or develop an 'original study'. If there was some testing of the student's statistical skills an emphasis was usually placed on open book exams. However several schools indicated that there would not be any examination of this subject.

**Conclusions about the teaching of statistics**

From the evidence available to the investigator it appears that only limited attention is being given to the teaching of statistics in first qualification professional courses. If it is included, it forms part of research methods as an introduction to the use of quantitative methods in the investigation of ILS problems. This lack of grounding in statistics will be a cause of concern for the Section.

**Some possible explanations**

The findings were somewhat unexpected, so possible explanations were reviewed.

Looking back at ILS education around the globe, the 1970s were probably a high point for statistics. Firstly, it was a time of expansion both in the length of courses and numbers of academic staff, often drawn from outside the profession. In the UK B C Brookes, a noted statistician, was teaching information science at University College London. At what was then the North-Western Polytechnic in London Nat Lievesley, a statistician, was recruited to teach statistics. Secondly, research was growing. In the US Gene Garfield and his research into citations encouraged Don Kraft, Ed O'Neill and others in the US schools to explore citation analysis and bibliometrics. At the same time there was

interest in rigorous survey methods with Ellen Altman and Ed de Prosopo carrying out groundbreaking studies at Rutgers. In the UK B C Brookes was teaching bibliometrics at UCL and encouraging his research students to study applications of the Bradford-Zipf distribution. The forerunner of the Library and Information Statistics Unit at Loughborough University, the Library Management Research Unit at Cambridge University – directed by Len Schofield and having John Urquhart as a member of staff – was applying statistical methods to management problems. The combined research and input to teaching on both sides of the Atlantic produced an ‘excitement factor’ which was conveyed to students.

Researchers from both sides of the Atlantic were encouraged to come together to share ideas in conferences organised by bodies such as the US National Science Foundation and the Engineering Foundation.

These activities encouraged an interest in statistics and their application in seeking solutions to the real problems facing information services and libraries at the time. Furthermore, this was accomplished against the difficulties that students faced since many entering the profession had a humanities background.

But the curriculum became overloaded and further problems emerged as a result of the impact of developments in information technology in the 1980s. In the early days when computing entered the curriculum it often included lectures and practical exercises in programming which required a degree of numeracy – but this element was later dropped. In the 1990s the economic pressures on the universities in Australia and the UK resulted in more modules being taught in common with students from other disciplines. From the universities’ point of view this was cost-effective. For the students it lacked the vital examples linking the

statistical methods to their use within the profession. Regrettably some schools failed to see the relevance of what could be seen as a difficult subject to study. But information and library studies is not alone in facing this emerging problem, for we need to be aware that it is also being experienced by other professions.

Achieving a balance between the preparation for a professional career and what can be included in a first qualification course is the cause of many a headache for academics. Small group teaching is not seen as being cost-effective in the eyes of university administrators and government today.

### **The implications of the current situation**

It was fortuitous that the two similar projects emerging from IFLA Sections were brought together, for there is a strong relationship between management and statistics.

Given the complexity of the decisions that managers are required to make, often under pressure, numeracy and a sound understanding of statistics become essential tools. (Long past are the days, when as a consultant, one came across large academic libraries where even the keeping of statistics was not taken very seriously. The task could be delegated way down the hierarchy and chief librarians could fail to compare the statistics provided in their annual reports from one year to the next.) The literature indicates the growing application of statistical approaches in the recent issues of *IFLA Journal* (Sumsion, 2001), *Library Administration & Management* reporting LibQUAL+™ (Snyder, 2002) and other approaches to assessing service quality, and the very successful Northumbria conferences on performance measurement.

Not only has decision-making become more complex but also managers face the question of accountability and hitting targets, particularly in the public sector.

Research is also growing in importance once again. In the UK the submission of evidence about the quality and quantity of research to peer group evaluation can enhance funding for the ILS schools.

Research output in the schools is generated in three ways. Firstly by the academics through personal or funded projects. Secondly there are the members of the research staff generally funded by external agencies. Today these agencies tend to follow government priorities and fund projects that are linked to the government's interests. In general, research that is based in the sciences has not been well funded in recent years, but there is a recent welcome sign in the UK that it will increase. The ILS schools should be able to capitalise on 'information science' and the past legacy of research and gain its share. Thirdly, the number of higher degree students in the discipline has increased around the globe, and there is scope for more statistically based research if only they have adequate preparation. If the discipline is to flourish in the universities, it is imperative that the profession develops a cadre of well-equipped research workers.

A more recent and relevant development is the impact of evidence-based professional practice, which emerged from the medical profession, and which is now being applied across many professions. This approach assists practitioners to identify a problem and the information required to solve the problem precisely, to conduct a search of the literature, to select the best of the relevant studies and to apply evidence to test their validity and assess their strengths and weaknesses (Centres for Health Evidence, 2002). It requires that practitioners have the skills and knowledge to be able to judge the quality of research that could have application in their services. It follows that practitioners need to have a sound grounding in research and statistics.

Therefore, we have to find some solutions to the problem – luckily, the Section on Statistics is well placed to take action.

### **The role of the professional associations and accrediting bodies**

Earlier reference was made to the role of accrediting bodies and the curriculum in the information and library schools, but we could perhaps take a sceptical view of the real influence that the professional bodies have over the content and delivery of the curriculum in first professional courses today. The ILS national associations have always been seen as smaller, and sometimes, regrettably less important bodies than those of the larger professional associations. To put it bluntly – they may not have the same influence as, for example, those in law or medicine, when arguing for increased funding for education in their discipline. The profession tends to have a low profile, and may not have the high public profile that we would like.

So there is much that needs to be done. Firstly, to lobby national information and library associations to place statistics and numeracy higher on their agendas. The term 'agendas' has been chosen with care, for in addition to the curriculum for first qualifying courses, the ILS associations also have a concern for continuing professional development. In many cases the associations, or their sub-groups, initiate and are responsible for the delivery of short courses and institutes. Their concern to increase the quantity of such programmes is evident, for example, in the Congress on Continuing Professional Education organised by the American Library Association. This needs to be a joint campaign by practitioners, academics and research workers coming together for their common good.

Secondly, there is a need to lobby in the broader field of the national statistics associations for recognition of the research

carried out in the ILS sector. When bibliometrics was emerging in the 1970s considerable interest emerged from the Royal Statistical Society in the UK and this was maintained by the statisticians teaching in the ILS schools who were active in their professional body. Perhaps authors of papers with a statistical content could be encouraged to submit to the literature of two disciplines.

Getting the issue on national agendas is an urgent matter.

### **Some remedies for consideration by the Section**

To this point the proposals offered for action are those that can be taken at a national level. The Section on Statistics has some powerful allies within IFLA and enjoys a high profile which has resulted from its activities to date. One example of the high profile in recent years is the large number of people who attend its open meetings and contribute to discussion.

In terms of allies within IFLA it can count on the support of other Sections. Support would be forthcoming from the Section on Management and Marketing, the Section on Education and Training, and from September 2002 there will be a new Section on Continuing Professional Education and Workplace Learning. In the parallel study on the teaching of management it was found that not all ILS schools have a compulsory module on management. The new Section on Continuing Professional Education and Workplace Learning has a wider remit that could be of benefit to the Section on Statistics. So there is scope for a coming together of the Sections, and perhaps, also looking back to some of the initiatives taken by the Section on Management working with Education and Training in the past. In the 1980s there was considerable communication with the International Council on Archives and the now defunct FID about a core curriculum. From

observation, it seems that the archives schools share the problems of the ILS schools in being small academic departments, and are, at the same time considering the teaching of management in greater depth. Some further discussion on a common core could be timely.

But perhaps that is a vision for the future and a more achievable goal would be the development of a model curriculum for the teaching of statistics and numeracy which could have the endorsement of the IFLA Section for submission to the national accrediting bodies. As a result of the discussions concerning management in the ILS schools which commenced in the 1980s, Miriam Tees from Canada prepared a set of guidelines for the teaching of management (Tees, 1993). In carrying out the parallel study it seems that many ILS schools adopted her guidelines that are still used today. They form a carefully considered basis on which to set the local context. In the reality of today such work can be of great benefit to new and part-time lecturers, and an international set of guidelines carries considerable credibility in the age of globalisation. So the Section could consider this, and since this is also the age of collaboration, perhaps the Section on Education and Training might be very interested in such a project.

Given the pressure on the curriculum there could be another solution in the development of short courses for independent study. This could have the advantage of being studied by those who want to acquire the skills – highly motivated students putting their new knowledge into an operational context. It would be of particular benefit to practitioners who did not study this subject during their formal education, or who, perhaps now, can see more clearly the relevance to their daily work.

Since statistics has international application, the preparation of a short course could be

sponsored by the Section. This could then be made available for translation into a range of languages. One of the lessons of writing new courses, particularly for independent or distance learning, is the time involved – and academics today have the pressure to research as well as to teach. By drawing together subject knowledge, instructional design and skilled assessors of the students' work, a team approach might make it possible to make a major contribution to continuing professional development and workplace learning.

## Conclusion

The conclusions are simple. There is a problem in the development of the profession since statistics is receiving limited attention in first qualification teaching in the ILS schools, and this affects both research and professional practice. The answer could lie in some concerted lobbying at national levels and with other IFLA

sections, and the development of a model independent learning course which could be translated into various languages for local application.

Such action would be of considerable benefit to academics, to practitioners and to lobbyists in raising the profile of the profession. The Section has the motivation, the skills and the track record to take this action.

In preparing this paper I came across a quotation by Andrew Lang, noted Scottish scholar and who, as some of you may recall, has an interest in fairy tales ...

*He uses statistics as a drunken man uses lamp-posts – for support rather than illumination.<sup>1</sup>*

We need to ensure that practitioners move to a better understanding of the real purpose and application of statistics.

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<sup>1</sup> Quoted in Mackay, Alan and Ebison, Maurice. *The Harvest of a Quiet Eye*. London, Institute of Physics, 1977.

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