Teaching Statistics - Spreading the Word

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1. Introduction

This paper reports on the philosophy, contents, and readership of the journal *Teaching Statistics* since it was launched in 1979. Recent changes in the editorial policy are discussed.

2. The aims and scope of the journal

Teaching Statistics aims to break down the unhelpful division often encountered between statistics as a discipline itself and statistics applied within other disciplines. It is dedicated to covering statistical education for "pupils aged from nine to nineteen", although this range is only a very rough guide to indicate the levels covered. Ever since its inception, *Teaching Statistics* has also sought to help teachers of geography, history, economics, business studies, the social and physical sciences, by showing how statistical ideas can illuminate their work in order to encourage the proper use of statistics in their teaching. This laudable aim is very difficult to achieve, however, for a variety of reasons.

In 1989, ten years after its launch at Sheffield by Professor Vic Barnett and Peter Holmes, a major reformulation of the journal was incorporated. The new editorial policy was to provide more material of direct use in the classroom. However, being the only international journal devoted to statistical education, it was recognised that it must continue to serve the needs of those in colleges and universities teaching more advanced aspects and applications of statistics who had found *Teaching Statistics* so useful in the past. Besides the main articles there are now several "regular features" to reflect the new policy.

Project Parade describes and discusses statistical studies which students in schools and colleges have undertaken, possibly for examination assessment or for the UK's Annual Applied Statistics Competition (e.g. comparing the average age of death during the 19th and 20th centuries).

Practical Activities provides suggestions for classroom work often in a form which can be photocopied and used directly (e.g. using a reaction timer made from a 30cm ruler to investigate whether performance improves with practice).

Historical Perspective discusses topics from history which provide insight into probability and statistics and with which the teacher may enliven lessons or help get across concepts (e.g. the gambling problems of De Méré and Cardano).

Computing Corner provides reviews of software, suggestions for activities, and has a Software Library of useful routines written in BASIC.

Curriculum Matters considers topics relating to curriculum and assessment (e.g. coursework assessment; the National Curriculum).

Data Bank presents collected data and suggestions as to how the data might be analysed. This is often on a topical issue (e.g. Olympic results; nutrition and health; energy consumption).

Problem Page. Unlike the other sections, this is designed to cause the reader difficulties rather than to make life easier! Not all the puzzles are of closed type. Some are very open-ended indeed, and invite the reader to investigate, and report back.

Reviews, Letters, and News are all sections which continue as in the old style of the journal.

3. Content of articles, origin of authors and readers

TABLE 1
Principal subject matter of journal articles

Subject Matter	Old Style (Vols 1-10)	New Style (Vols 11-12)
Probability and distributions	46	3
Sampling and inference	25	5
Regression and correlation	20	5
Educational issues	20	10
Data collection and representation	17	9
Applications/modelling	16	4
Computers and computing	15	11
Measures of location and spread	11	1
Theoretical items	10	1
Other curriculum areas	10	2
Projects/practical work	9	11
Educational research/psychology	9	1
Calculations	5	-
Teaching apparatus	4	-
Games	3	2
History of statistics	2	3
Time series and indices	2	-
Design of experiments	1	-
	225	68

Analysis of the subject matter of journal articles is extremely difficult. Table 1 shows the outcome of a very subjective attempt. (A few articles, mainly computing, were allocated to more than one area.) Several factors are noticeable: many articles draw on probability and distributions; very few are from "other curriculum areas"; the change in editorial policy has led to an increase in computer-related and project-related articles, and a drastic decrease of theoretical articles.

To each article published to date the lowest educational level deemed appropriate has been assigned. The age range 11-18 has been divided into *Lower Secondary* (11-16), which covers general secondary education in the UK up to the end of compulsory education, and *Sixth Form* (16-18) which is the more specialised optional education often leading to the "A-Level" examinations (at 18 years). From Table 2 a shift from more advanced levels downwards can be seen which reflects curricular changes and, again, changes in editorial policy.

TABLE 2
Educational levels of journal articles

Educational Level	Old Style (Vols 1-10) %	New Style (Vols 11-12) %
Primary (7-11)	2	13
Lower Secondary (11-16)	26	34
Sixth Form (16-18)	52	34
Higher (18+)	20	19
	(N = 225)	(N = 64)

Relatively few articles have in the past been submitted by classroom teachers although efforts are being made to nurture this important source of down-to-earth readily usable material. Most unsolicited articles come from lecturers in higher education, many of whom have a keen interest in the teaching of statistics, possibly being involved in teacher education. However, in the last two years there has been a definite increase in contributions from primary and secondary schools (see Table 3).

TABLE 3
Occupation of authors

Occupation	Old Style (Vols 1-10) %	New Style (Vols 11-12) %
Education		
Primary (7-11)	1	6
Secondary (11-18)	15	30
Further (16+)	5	3
Higher (18+)	70	59
Other (e.g. industry)	9	3
	(N = 225)	(N = 65)

The subscribers form a wide section of the educational community in terms of subject specialism, type of institution, and geographical location. There are no statistics available concerning subject specialism. Data in educational institution is also uncertain as many subscribers use their home address. What seems clear is that most fall within the "mathematics and statistics" category (but often are teaching statistics to non-specialists from across the whole range of disciplines). School teachers are well represented from the UK but nearly all the overseas subscribers are outside the school system *per se*.

Geographical location is relatively easy to ascertain. The geographical analysis of subscribers is shown in Figure 1 which compares the data for subscribers with that for authors. Whereas the only major source of authors outside the UK is the USA, there is a substantial readership also in continental Europe.

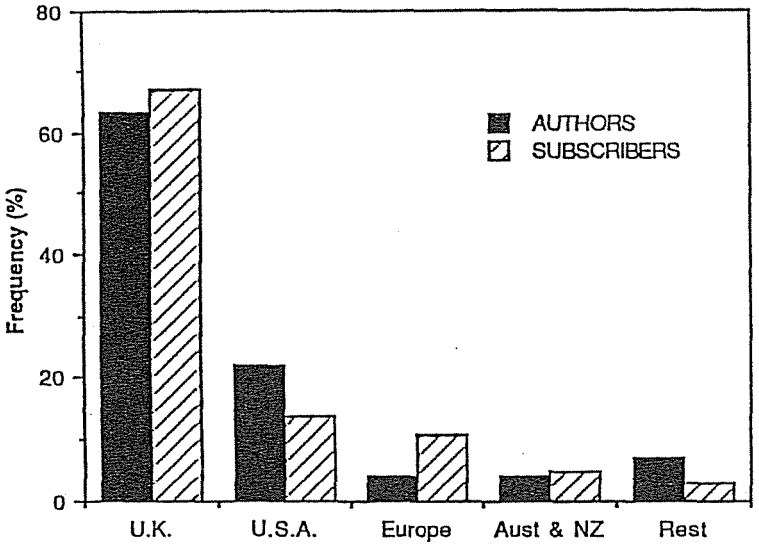

FIGURE 1
Location of authors and subscribers

It takes a long time from submission of an article by the author to publication. The refereeing procedure should guarantee a good quality of the final product although occasional errors creep through. The median time to publication is about one year. However, only just over half of submitted articles are published and many of these have undergone rewriting (see Figure 2).

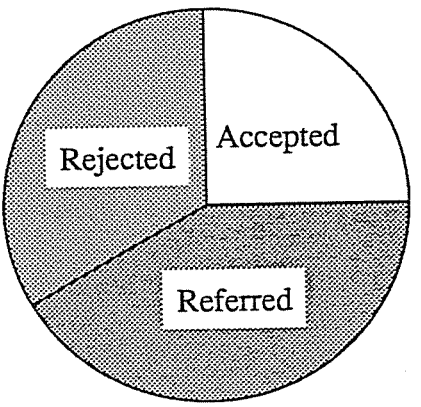

FIGURE 2a
Fate of submissions on receipt

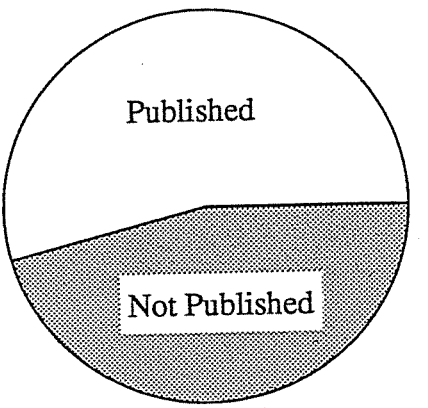

FIGURE 2b
Ultimate fate of submissions

4. The journal's influence on teaching statistics

How can a journal significantly affect the teaching of statistics? At the higher education level the answer is fairly clear. Many lecturers of statistics to non-specialists are subscribers or have access to libraries which take *Teaching Statistics*. What is just as important, they have the time to seek out new material and new ideas. At the school level the situation is more complex. Relatively few who teach statistics have direct access to the journal, especially if they are not in mathematics departments but specialise in biology, economics, geography, etc. However, the influence of a journal can be indirect. Teachers of other subjects turn to their mathematical colleagues for advice from time to time. Furthermore, *Teaching Statistics* is read by influential teacher trainers, advisors, and by leading teachers. Those who contribute to the journal also learn from it and pass on their newfound knowledge. Personal experience illustrates this. The writer gave a lecture on "Practical Work in Statistics" at the UK's Mathematical Association Annual Conference (1990) and for the lecture used material exclusively from issues of the journal. Thus, the ideas can be disseminated indirectly to those for whom the journal itself remains "a closed book".

Teaching Statistics is a journal for *all* who teach statistics in whatever way from primary school right through to college. All those involved in its publication hope all progressive statistical educators will see it, read it, enjoy it, subscribe to it, contribute to it, and recommend it to others! Contributions, comments, suggestions, and offers to help with refereeing, reviewing, administration are welcomed.

A thriving international journal supports and is in turn supported by a thriving international community. The series of ICOTS Conferences and the firm establishment of *Teaching Statistics* together bear witness to the fact that statistical education is coming of age.