TEACHERS AND COMPUTERS:

A SURVEY OF HOW TEACHERS IN SEVEN HIGH SCHOOLS IN THE NORTHERN SUBURBS OF JOHANNESBURG PERCEIVE COMPUTERS AND THEIR USES IN EDUCATION.

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Submitted in accordance with the requirements for the degree of Master of Education at the University of the Witwatersrand.

Supervisor:

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Declaration:

I declare that this research report is my own unaided work. It is being submitted for the degree of Master of Education at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.

Signature: A.G. Thomas. Date: 92.03.20

Thanks:

To Professor Graham Hall, my supervisor, for the time, interest, and enthusiasm he offered in the middle of a very busy schedule, and especially for the care with which he scrutinised the draft copy and made suggestions for its improvement.

Dedication:

To my wife Bets, and children Susan, Rowena, and Christopher, who have all been very understanding and supportive. I could not have done it without them

Teachers and Computers: a survey of how teachers in seven high schools in the northern suburbs of Johannesburg perceive computers and their uses in education.

ABSTRACT

This study presents the findings of a survey conducted in August 1991 to identify and analyse high-school teachers' perceptions of computers and their uses in education.

The study has a triple purpose: to investigate how teachers perceive computers and their uses in education; to ascertain their knowledge and experience of computers; and to obtain demographic and biographic information.

The current uses of computers in education, and the quality of educational software available, are considered first. A discussion of the term "perception" follows, with a description of the design, construction, and use of the survey instrument.

The data provided by the instrument is then analysed, and the findings are presented. (A copy of the survey instrument is appended, together with statistical analyses of the data provided by each question in it.)

Some of the findings are:

* The respondents were positive about the general concept of computers and their use in education. None were negative, although some had reservations or were non-committal.
* Although in favour of the use of computers, teachers were not yet ready either to teach about them, or to use them in the classrooms with their pupils.
* There was greater support for the use of the computer as a management tool than as a medium of instruction.
* Lack of knowledge about computers was perceived as the greatest disadvantage of computer use in general.
* There was a great diversity of knowledge and awareness, both within the individual schools and among them, as to just how their computers were used.
* A significant number of teachers already found computers valuable and used them regularly. Word-processing, spreadsheets, and Updating Records (Databases) were the three uses best known to these teachers.
* A very large percentage of teachers (94.9%) were interested in learning more about how to use a computer.

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SECTION 1. THE REASON FOR THE RESEARCH.

"If a technology is not well understood there is a tendency to either dismiss its promise quickly, or worse yet, exaggerate enormously its possibilities."
(Adams 1987)

Computers (generally in the form of Personal Computers, but recently including also XTs and even ATs) are to be found in varying numbers in many high schools, together with a variety of software of varying quality and suitability. In most schools computers are used almost exclusively for administrative purposes, in some also as a subject of study, and in a few as an additional medium of instruction.

Should research into computers in education result in the more general involvement of computers in the subject classroom as well as for administrative purposes, teachers would be at the cutting edge of the introduction, use, and evaluation of these machines and the programs run on them. They would need to be in a position to make informed judgements on computers and their use in education.

It was my perception before starting this research that most teachers seemed happy to have computers used by others to ease their administrative burden, but were

generally unwilling to learn more about them and how to use them themselves. They remained thus unaware of the potential advantages of computer applications in their own work. They were also not in a position to consider the practical implications of the use of computers in their own classrooms, or to assess the ideological consequences for education at large.

An analysis of current teacher perceptions of computers and their uses in education would thus be valuable in:

a) developing teachers' understanding of what computers can and cannot do in education; or

b) preparing teachers for the possible use of computers in schools on a wider scale.

SECTION 2. THE PURPOSE OF THE RESEARCH.

This study is concerned with the perceptions held by teachers at seven high schools in the northern suburbs of Johannesburg which have computers in varying numbers, and has the following purposes:

a) to investigate how teachers at these schools currently perceive computers and their uses in education;

b) to ascertain the knowledge and experience of these teachers with regard to the use of computers in education;

c) to obtain relevant demographic and biographic information about these teachers and their schools.

SECTION 3. BACKGROUND TO THE RESEARCH - COMPUTERS IN HIGH-SCHOOL EDUCATION.

3.1 Teachers, their pupils, and computers.

Computers do not have to be used in education, but if they can help teachers to do a better job, or can be used to improve the teaching/learning situation, then they should be used if possible. They certainly can not be regarded as providing a panacea for current educational ills. However, if they are to be more widely used in education, or should the curriculum of the future be affected by the ubiquity of computers (together with advances in programming techniques, storage devices, and communications), then any teacher perceptions which may result in antagonism, apathy, or trepidation will have to be addressed.

People who have grown up with the Personal Computer tend not to fear computers in general, but those who identify the PC with its mainframe forebears seem to view it with some misgiving. Teachers frequently fall into this category. Their perceptions seem to be socially-received, and founded more on a fear of the unknown than on personal experience; this may subtly affect their relationships with their "computer-comfortable" pupils.

Any use of computers in education should be to assist and complement, not supplant or subvert, the activities of the teacher. It could be argued that, as with many media or tools, it is not what it is, but what is done with it, that matters; but there are far-sighted educators who perceive in the very ubiquity of computers a possibly profound ideological impact on education.

Chandler (1987) points out that computers can be seen as altering ideas, experience, knowledge, and information in the way they reduce these concepts to mere data and store, process, and represent them. If we are not aware of this, there is the great danger that the parts can become more important than the whole, especially when the data is encountered in a context-free situation. Van den Berg (1985) makes a similar point, as does Adams (ibid) who adds (p. 20):

> It is evident that technology (computers, video, etc) is becoming increasingly important in education. What is not clear is whether our new electronic technology will improve either education or thinking. What is plain is that electronic communication modes are changing how we come into contact with knowledge.

It is thus becoming important that teachers participate in

these electronic modes of communication, to stay in touch with their pupils. They will then be in a position to help their pupils put electronically-presented (and therefore limited) experiences and knowledge into a broader human context. This they have largely done in the field of video and television; but not in the sphere of computers.

Work is already being done at teacher-training institutions to introduce teachers to the possibilities and pitfalls of computers and computer-aided learning (Hall 1990); but teachers already at the chalkface are the ones whose acquaintance with, or support for, any new tool or medium would be vital for its meaningful implementation and use.

If computers are to be more widely used in education (on the assumption that their use in one form or another does or will offer something of value to pupils and their teachers) the area of teacher perceptions of them has to be explored first. Failure to understand the perceptions of practising teachers would mean that any potential advantages of involving computers in education would never be realised.

As Davies (1985) put it: "The critical variable distinguishing the effective implementation of computers from the mediocre is teacher commitment."

3.2. Current uses of computers in education.

These can be divided into three broad categories:

3.2.1 computers and school administration;

3.2.2 computers as a subject of study;

3.2.3 the computer as a medium of instruction.

3.2.1. The computer as an administrative tool.

This is the most common use in education, parallel with commerce and industry. Data-base programs such as SASPAC or Microscope are written or used specifically to suit school or departmental requirements - to process marks and other data; to produce marksheets, reports, statements, accounts, and departmental returns of various kinds; to store records; and to keep track of stock.

In some schools wordprocessors are used by secretarial and teaching staff for correspondence and other typing such as notes, tests, and exams. Spreadsheets can also be used to assist in planning and financial forecasting.

There may still be teachers who decry what they describe as the dehumanising effects of computerising such items as reports, but the use of computers in school administration

can certainly free teachers from much administrative drudgery, thus giving them more "people" time.

3.2.2. The computer as a subject of study.

Another "use" of the computer is as a subject of study in its own right. This takes two forms.

The first is a matriculation subject, known as Computer Science. This approach involves the study of how computers work and how to program them in computer languages such as BASIC and PASCAL, together with a short history of the machine and a brief exploration of its social and ethical implications. At present only selected students are offered the opportunity to take this course.

The second form or approach, known as "Computer Familiarity" or "Computer Competence", concerns itself with the introduction of pupils to standard commercially-available computer application packages such as word-processors, databases, spreadsheets, and operating systems, and is less formal, having no public examination.

Aware of the ubiquity of computers in tertiary education, commerce, and industry, some schools have set time aside for students to familiarise themselves with computers, not in terms of how they work, but how to use them to run

software which is already available. The computer in this approach is viewed as a tool whose uses students can explore for themselves, rather than a subject for study in its own right.

[Another, related, approach is that adopted by many primary schools - familiarising students with computers by introducing them in a very practical way to elementary programming. The most popular language used for this purpose is Logo, which puts the student in charge of both the learning situation and the computer, and at the same time introduces many valuable logical, spatial, and mathematical concepts and skills. (Papert, 1980)]

However: "Most (educators and parents) now agree that devoting significant amounts of time to basic instruction in operating and programming computers is not necessary in the school. The emphasis is turning to learning about typical computer applications in a variety of fields." (Rich 1991)

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Programs written for this purpose go under such generic titles as Computer-Assisted Learning or Instruction (CAL or CAI), Computer-Based Education or Training (CBE or CBT), or Computer-Managed Instruction (CMI).

As a medium or tool the computer joins the time-honoured list of slate, pencil and paper, blackboard, and textbook; together with more recent additions such as film, video, slides, the overhead projector, the tape recorder, and the photostat machine. The computer has in fact the potential to combine all of these media - but see 3.1 above.

Rich (ibid) quotes a UNESCO (1988) document on the new information technologies in education as follows: "Experience in CAI-related fields during the last two decades did not result in convincing arguments either in favour of or against a massive introduction of computers as a teaching tool."

On the other hand, it is claimed (e.g. by Siegel and Davis, 1986) that teaching/learning programs ("education software") could be designed which, at their best, would differ significantly from many of the other media named above in several very important respects:

* Interactivity - a program could be designed in such a way as to ensure interaction between student and

material via the medium of the computer. This contrasts with the passive observation and lack of student involvement which often characterises the other media;

* Non-linear presentation and individual adaptation - unlike the other media a computer program does not have to present its material in linear fashion. Because a program can keep information in reserve, it can offer immediate individual entry at points and levels appropriate to individual learners, with cross-referencing and explanations, definitions, or developments, available on demand. Programs could be designed to make material relevant, meaningful, and intelligible to the individual learner in terms of his or her own needs and abilities;

* Mastery learning - computers, with their endless patience, absence of personal judgement, objectivity, and "individual" attention and record-keeping, offer the best medium by which the advantages of mastery learning (Bloom, 1971) could be realised. (It is worth noting here that the De Lange Commission on Education in South Africa (1982) suggested that at a time when there is a shortage of skilled manpower, Bloom's concept of mastery learning should be implemented.)

The technology is certainly there to meet these claims, but it has not yet been harnessed specifically for educational purposes.

3.3. The quality of the educational software currently available.

Rich (ibid) refers to a general agreement in an OECD (1987) publication: "Software is available which demonstrates the potential for computer-based learning, though much of what is used in schools is inadequate." He goes on to point out specifically that "a major factor in the inconclusive results from our initial application of computers in education is the quality, or rather lack thereof, of software. Bork (1986) succinctly summarizes the difficulties with present software. Among other things, he suggests it far too often deals with trivial learning material, provides too few interaction opportunities, and fails to individualize learning."

Very little "good" educational software in fact exists, and this situation may persist for some time. In 1985 Preece and Jones commented: "One of the most pressing problems for teachers waiting to get to grips with microcomputers is the lack of good educational software." The next year Nicolson and Scott (1986) were saying: "The problem is easily and simply stated - firstly, demand for

quality software vastly exceeds supply, and secondly, the production of good software is very difficult.... Few educational publishers are now willing to risk CAL publication."

Not much seems to have happened in the interim. The market even today for the mediocre educational software available does not appear large, and suggests that software publishers are unlikely to be prepared to spend more in this area in the near future. In the fourth quarter of 1990 for example, software sales for the PC in the United States grew by 22% overall, but by only 6.6% in education (Corporate Computing Today, July 1991).

Friedler and Shabo (ibid) put it in 1991 from the teachers' point of view: "Many educators ... are wary of educational software because in their opinion development costs far outweigh potential benefits."

The problem of educationally appropriate software thus remains a major one. Education is a very human process, which cannot occur without human involvement, human intervention and human mediation. As suggested earlier, there is a greater number of ethical, moral, cognitive, social, and cultural questions to be worked through with regard to the use of "education software" than with regard

to an introduction to the standard applications packages.

Some educationists and computer "specialists" are making extravagant claims, and depending largely on their philosophy of education, educationists tend to go to extremes as proponents or opponents of the potential of the computer as a medium of instruction - as the opening quotation from Adams in section 1 above reminds us. Hall (ibid) refers to McLintock (1989) and Bowers (1990) as cases in point. Compare also the views of Perelman (1989) and Appel (1987). Van den Berg (1985) however provides a balanced perspective.

3.4. The Development of the Personal Computer (PC).

The development and marketing of the Personal Computer in the last decade have resulted in a significant change in perception of the computer by society at large. In South Africa specifically, the withdrawal of Apple in 1985 helped to contribute to the de facto standardisation of operating systems and the resultant proliferation of "compatible" applications software on IBM "clone" hardware at decreasing cost. Three quotes from Vining (1986) are apposite: "The IBM PC is a de facto standard, for better or for worse"; "The enormous library of IBM PC software"; and "In 1985 IBM and Olivetti between them had 66% of the PC market in SA".

The rapid development world-wide of data-storage and communications devices has also brought the speed, power, and versatility of computers within the reach of many more people than was possible ten years ago.

PC's, XT's, and AT's have arrived on desktops in ever-increasing numbers, and "user-friendly" programs for them have become readily available. It has been mentioned before, but bears repeating here: the hardware is not as important for most users as the software that runs on it. No hardware has any value for the uninitiated without appropriate and effective software. The increasing availability of such software meant that the demystifying process could begin, and more and more people started using computers in their everyday lives.

Largely as a result of these developments in the marketplace, the frame of reference within which many writers on computers in education think has changed fundamentally in the last few years.

The earlier stress on programming has to large extent given way to the use of a few commercially-available educational programs, and to the educational use of standard applications packages. "Strategies have changed

and microcomputers are now tools for productivity rather than just objects of study." (Lamon and Sanner, 1990)

The two different approaches to the computer as a subject for study outlined in 3.2.2 above and reflected in this quotation indicate this change in perception.

The first approach, Computer Science, can be seen as elitist; it reserves the computer as a subject of study for the computer buff, and tends to maintain the image of the computer as a mysterious, complex creation which cannot be used unless one knows how to program it in a special computer language. But in preserving the "computer mystique" so long cultivated by the computer world, this approach also suggests that computers are inaccessible to most people.

The second approach, Computer Familiarity (or Computer Competence), seeks to make computers accessible to all. Computer users are not regarded as members of some sort of exclusive club or secret society. They are not expected to understand how a computer works, or to know a computer language. The emphasis in this approach is not on the machines, but on the programs that can be run on them. Instead of the user being expected to adapt to the machine, programs are expected to be written with non-computer-scientists in mind.

SECTION 4. DEFINITION OF SOME TERMS USED, ESPECIALLY "PERCEPTION"

The following terms, arising from the title of this research report and pursued in the literature review which follows, require clarification and definition at this stage: high-school teacher, computer, educational use, and perception.

i. A high-school teacher is one who is involved in the education of students in the last five of their twelve years at school, i.e. standards 6 to 10. (More specifically, for the purposes of this survey, the term refers to teachers at seven high/secondary schools in the northern suburbs of Johannesburg.)

ii. A computer is "a machine which processes information electronically" (Megarry at al, 1982).

iii. An "educational use" is one in which a computer is (or could be) involved in any way in the teaching/learning process, or in a teacher's teaching-related activities.

iv. The concept of perception is central to this study, and needs elaboration.

The OED (1989) entry on the noun "perception" offers nine meanings under the following general definition: "sensuous or mental apprehension, intelligence, knowledge; the action, faculty, or product of perceiving".

The entry on the verb "perceive" in the same dictionary also offers nine meanings under the general definition of: "to take in or apprehend with the mind or senses".

Both entries specifically mention both mind and senses. The first three meanings in the verb entry make this very clear: 1. To apprehend with the mind; to become aware or conscious of; to observe, understand. 2. To take in fully or adequately; to grasp the meaning of, comprehend; understand. 3. To apprehend (an external object) through one of the senses (esp sight); to become aware of by sight, hearing, or some other sense; to observe; 'to discover by some sensible effects'.

Turning to the entry on "perception" in the American ERIC lexicon, however, we find the meaning of the word not only restricted to the senses, but actually reduced to only the last one of the nine meanings provided by the OED under the noun entry, i.e. "that branch of psychology which is concerned with the study of perception, viz: the neurophysiological processes, including memory, by which

an organism becomes aware of and interprets external stimuli or sensations."

This means that ERIC must use a different term to cover those meanings of the word "perception" provided by the OED which refer to more than the purely sensory. The term used by ERIC for this purpose is "attitude". This in turn gives rise to considerable difficulty, as the following discussion reveals.

Anderson (1981) quotes Fishbein and Ajzen (1975) as suggesting that the term attitude is "characterised by an embarrassing degree of ambiguity and confusion". He categorises "attitude" as an affective characteristic, and delineates the five essential features of affective characteristics in general as: a) emotion, b) consistency, c) target, d) direction, and e) intensity. He claims: "Attitude differs from other affective characteristics in terms of target (most likely fairly concrete, social objects) ... direction (favourable or unfavourable) ... and intensity (moderate, compared to say interest or value)."

Following Allport (1935) and Fishbein and Ajzen (op cit), Anderson then defines "attitude" as follows: "Attitude can be considered a moderately intense emotion that prepares or predisposes an individual to respond consistently in a

favourable or unfavourable manner when confronted with a particular object."

He stresses that attitude is an affective characteristic (to do with feelings and emotions) as opposed to a cognitive (to do with knowing and thinking) or a psychomotor (to do with acting and behaving) one.

When these qualifications or limitations are compared with the several meanings provided by the OED for "perception" other than the purely sensory one accepted by ERIC, it becomes apparent that there are still shortfalls. The cognitive and psychomotor areas are yet to be covered. (Heil in his book "Perception and Cognition" (1983), to which we will shortly turn our attention, deals with precisely these areas.)

For this reason the term "attitude" can not be accepted as a near synonym for many of the meanings of "perception"; however, since ERIC uses the term in this way, it must be recognised as such with reference to the considerable body of literature available in that resource.

Heil (op cit) begins by pointing out that "perception is one central constituent of the cognitive domain" (p. ix) and goes on to state that "perception is best regarded as

a linkage connecting beliefs to ordinary physical objects and events" (p2). He claims that "in perception we gain beliefs by way of the senses" (p4) but points out (p5) that "perception, as distinguished from sensation, turns out ... to be always indirect, inferential."

He goes on (p11) to quote Gibson's statement that "perception is the picking up of information" and equates this with his own claim that "perception is the acquiring of belief" because "it is structured stimulation, over time, that produces in us reliable perceptual beliefs about our surroundings" (p13). He puts it another way when he says (ibid) "structured stimuli produce certain beliefs in perceivers".

Heil sums up his argument as follows (p137), and in doing so presents us with a suitable definition for this study:

"Perceiving is best regarded as a causal process, one leading from some perceived thing or event to a belieflike cognitive state via a chain consisting of information-bearing physical stimuli and sensory mechanisms." However, and importantly, "the having of sensations is not essential to perception" (p138).

(NB. It is not the purpose of this study to attempt to explain the causal process leading to teachers' current

perc tions of computers in education, but rather to obtain a description of the "belief-like cognitive state" which has resulted from the proc s.)

SECTION 5. A REVIEW OF RELEVANT LITERATURE

Two ERIC searches were carried out in July 1991. The first linked the ERIC headings "Computer Uses in Education" and "Teacher Attitudes" (see section 4. iv above), and yielded a list of 98 articles. The second, linking "Attitude Measures" and "Computers" and yielding a further 37 articles, is more applicable to section 6 (The Design the Research) and the relevant articles will be referred to there. There was some overlap, with several articles being found in both searches. Only the items in the first search which were most relevant to the present study are referred to in this review.

Sabinet, Navo, and Dissertation Abstract Searches were also carried out, together with a manual search at the University of the Witwatersrand, and a computer library search at the HSRC and Unisa.

It was pointed out in section 3.3 above that, largely as a result of developments in the marketplace, the frame of reference within which many writers on computers in education think has changed fundamentally in the last few years. The earlier stress on programming has to a very large extent given way to the use of a few commercially-available educational programs, and to the educational use of standard applications packages.

Much of the earlier literature on computers in educatio including that on teacher perceptions of them, has thus become almost obsolete (Meyer 1986), but some of the earlier approaches and findings remain valuable and relevant.

An early researcher into "Educators' perceptions of computers in education" was Stevens (1982), who replicated her own 1979 survey in 1981 "to compare and assess knowledge and attitudes of Nebraska K-12 teachers, Teachers' College Faculty, and student teachers" (AEDS abstract). Her findings were, inter alia, that "all sub-groups surveyed in 1981 were significantly more knowledgeable about computer usage and about computers than similar sub-groups surveyed in 1979" (p.2); that "over 80% of all 1981 sub-groups surveyed believed computers were advantageous to education" (an increase from 42% in 1979) (p.6); but "all sub-groups indicated a lack of skills either to teach computer literacy or to use computers as instructional tools" (p. 12).

Cooper (1982) surveyed the attitudes of adults towards the use of computers in schools and found that although "respondents did not always have strong opinions regarding the use of computers in the schools", nevertheless "the

entire population of respondents strongly expressed the belief that knowledge of computer use is increasingly important".

Engelbrecht et al (1983) in Chapter 2 of their report for the De Lange Commission on "The computer in education and training", prepared for the Main Committee of the HSRC Educational Research Programme and the Education Working Party, made four recommendations on the use of the computer in formal education: the promotion of computer awareness/literacy; teacher training with the emphasis on computer literacy; the development of appropriate educational courseware for CAL/CAI; and curriculum development, based on the identification of points of interaction between Information Technology and the existing syllabuses.

Goddard (1984) addressed specifically the question of teacher perceptions as they related to courseware/ software, and reached the following conclusions (p.17): the subject taught was not an important factor in determining perceptions; sex, grade taught, and academic background were not major factors; teachers suggested a variety of different types of courseware ranging from the creative and open-ended to the pedantic and highly structured; the availability of a computer in the school had a positive effect on the teacher's perceptions of its

role.

Chandra (1984) presented "A case study of teachers' perceptions about computers in teaching within the social organisation of a comprehensive school". He looked at far more than perceptions and uses, but offered a comprehensive overview of both the problems of implementation and teachers' perceptions of computers in teaching in a single school. His identification of eight categories of teacher perceptions of computers provided a complete question in the survey instrument in the present study (Question 29).

The Education Turnkey Systems report on "Uses of computers in education" (1985) provided an overview of the computer-in-schools status quo in the United States of America at that time, "documenting the impact of computers on many aspects of elementary and secondary school operation - e.g. uses to which computers are put, student performance and attitudes, and teacher attitudes" (Eric abstract).

The report points out that "There is emerging evidence that educators' attitudes are moving in a positive direction and seem to be related to exposure and familiarity with computers", and that "student attitudes

... in the long run will be a function of the quality and type of software that is available in schools" (p. 6). It looks also at the change in concept of Computer Literacy, at that time in the process of shifting from programming towards the use of available applications and other courseware (p. 56).

Manarino-Lettett and Cotton's useful report on "Attitudes of teachers toward the use of computers in the schools" (1985) provides data on six aspects of teachers' attitudes toward computers - anxiety, instructional use, usage and accessibility, use by students, educators' level of training and competence, and educators' needs for training. Several of their "attitude" statements, and the categories used in two of their tables (Usage and Accessibility, and Training and Competence), were used in the survey instrument in the present study (in the form of question 22, and 32 to 34).

Articles which were found informative from a comparative perspective were those by Bellando (1985) on the relationship of computer anxiety to Math anxiety and Holland types, Tanner (1985) on teachers and classroom computers, Elkins (1985) on the attitudes of special education personnel towards computers, Herbst (1986) on how medical doctors in South Africa perceive computers, Carl et al (1986) on nursing attitudes towards computers

in health care, Nelson (1988) on attitudes of Western Australian students towards microcomputers, Austin's (1988) results of a faculty computing survey, Issa (1989) on variations in anxiety/attitudes of black high school teachers towards computers, and McCoy (1989) on determinants of computer use by teachers.

The computer library search at the HSRC provided a list of 101 items, but hardly any referred in any way to teacher perceptions. They were concerned mostly with CAL (the use of the computer as a medium of instruction) and the influence of information technology on schools, but Van den Berg (1985) and Long (1985) both suggested a very balanced approach to the use of computers in schools, and Appel and Appel (1987) in their critique of Sergo (a commercially available maths tutoring package) effectively argued the shortcomings of CAL at this stage from the point of view of their particular philosophy of education. The shortage of good educational software was also highlighted in the criteria provided by Elignaut (1985) and Self (1985).

To conclude this review, the situation prevailing generally seems to be summed up in the two most recent relevant ERIC articles. The first is the survey by Lamon and Sanner (1989) of microcomputers in secondary schools

in Oregon, the findings of which are very pertinent, and several quotes from which are apposite. "Most educators will agree that the instructional effectiveness of computers varies greatly in light of the type, the quality, and the quantity of available software in the school" (p. 22). "(Teachers') most prominent use of the computer is for wordprocessing of some type" (p. 26). "The anticipated use for new computers is: students' wordprocessing 35%, teachers' preparation 18%, computer literacy 15%, remedial work 12%, practice in Math/language skills 6%, computer programming 4%, other 8%" (p. 28). "The educational effectiveness of microcomputers, especially in the area of instruction, is observed as being insignificant....The underutilization of existing hardware and software imparts the view that computers are only helpful and not important in the improvement of the learning and teaching process" (p. 32).

The second article is a paper by Watanabe (1990) on the use of computers in Japanese schools. Teachers in Japan are "generally in favor of computers and have positive attitudes and opinions about the role of computers in society as well as in education. They tend to consider computers as a valuable tool to improve students' learning and enhance teaching effectiveness, and they are eager to learn more about computers as a teaching aid. However, due to the lack of systematic in-service teacher education

programmes on computers in the past, most teachers, especially those who are not using computers, consider that they do not know much about computers or their operation." (p. 8).

Of the teacher respondents in Watanabe's survey, 14.5 % in Japanese Lower Secondary Schools, and 30.2% in Upper Secondary Schools, could operate computers. Of these, only 25.6% and 44.3% respectively felt they could teach about computers. Computers were used in Lower Secondary Schools most for Science (22.7%), followed closely by Mathematics (22.1%), and then Industrial Arts (10.8%) and Social Studies (9.7%). In Upper Secondary Schools the order was Vocational Subjects (36.8%), Mathematics (18.6%), Science (15.2%), and Foreign Languages (8.0%).

SECTION 6. THE DESIGN OF THE RESEARCH.

6.1 Categories of data required.

As described in section 2 above, this research has a triple purpose. These are repeated here for convenience, together with the numbers of the questions in the research instrument which evolved to elicit the data relevant to each purpose. (A copy of the instrument is appended to this report - see Appendix B.)

a) First Purpose: to investigate how high-school teachers currently perceive computers and their uses in education.
(Questions 1 - 20, 21, 23 - 27, 29, 30, 40, 42, 59.)

b) Second Purpose: to ascertain the knowledge and experience of these teachers with regard to computers and their uses in education.
(Questions 22, 28, 30, 31 - 39, 41, 42.)

c) Third Purpose: to obtain relevant demographic and biographic information about the sample - these teachers and their schools.
(Questions 43 - 60.)

To achieve these three purposes, reliable and valid data

were needed in three categories, which were in turn further subdivided into ten different areas as follows. (The numbers of the questions relevant to each of the ten areas are supplied with each. They are obviously grouped differently for each area, and there is some overlap.)

A. Category One. **Teachers' perceptions** of computers and their uses in the following six areas:

1. As a general concept with regard to the relevance of computers (mostly PC's, XT's, and AT's) in education.
   (Questions 1, 2, 7, 10 - 12, 14, 16, 19 - 21, 23 - 24, 29 - 30, 35, 42, 59.)
2. The use of school administration packages currently available on the South African market.
   (Questions 7, 27 - 28, 35 - 36, 42.)
3. The use of standard applications packages (e.g. wordprocessors, spreadsheets, and databases) as education management tools for teachers.
   (Questions 5, 8, 28, 35 -36, 38, 40, 42.)
4. The use of computers as a medium of instruction (known variously as CAL, CAI, and CBE).
   (Questions 4, 6, 13, 17 - 18, 25 - 26, 28, 35 - 37, 40, 42.)
5. Computer Awareness - the use of computers to familiarise pupils with standard applications packages and other programs already available commercially.

(Questions 3, 15, 35 - 36, 38, 42.)

6. Computer Science - a matric subject including writing programs for computers and the relevant terminology. (Questions 9, 28, 35 - 36, 42.)

B. Category Two. Teachers' background in computers in the above six areas as revealed by their:

7. Knowledge. (Questions 28, 34, 39, 41 - 42.)
8. Experience. (Questions 22, 28, 30 - 38.)

C. Category Three. Further related information about teachers and their schools:

9. Biographic. (Questions 33, 47 - 60.)
10. Demographic. (Questions 43 - 46.)

6.2 The compilation of the instrument.

For reasons of time and expense, a survey was decided on as the most suitable means of collecting the data. The survey instrument consisted of a perception-identifying questionnaire, which also included questions designed to provide the required background information about the respondents, their schools, and their knowledge and experience of computers.

Three factors are of obvious importance in the construction of such a questionnaire.

i) Great care must be exercised in the compiling of any instrument designed to identify perceptions; it is important to avoid any indication of the researcher's own perceptions, or to suggest any to the respondent in the wording of an item.

ii) The method of analysis to be used affects the format in which the responses are presented.

iii) Any ambiguities must be eliminated as far as possible, to ensure that questions elicit the kind of data they are designed to, with no misleading or irrelevant material.

Some of the techniques available for gathering data in questionnaires of this sort are:

1. Scaling techniques, such as Likert attitude scales (see esp. Abdel-Gaid 1986);
2. Closed questions (e.g. the Yes/No type);
3. Item-ranking (e.g. Herbst 1986);
4. Rating by choosing from among three or more alternatives;
5. Selection of options from a list;
6. Open questions and sentence completions (which can be difficult to categorise precisely in terms of a code).

Very few of the 37 articles found in the ERIC search mentioned in section 5 above (linking "Attitude Measures"

and "Computers") were of specific relevance in the compilation of this instrument. Some help with the general direction questions should take and the areas in which perception statements should operate was offered by Woodrow (1987), Chapline and Turkel (1986), and Vermette et al (1986). Bannon (1985) identified and validated two seven-item scales (a cognitive one and an affective one) for assessing computer attitudes. Two of these items were eventually used in the nineteen Likert-type statements in the instrument compiled for this study.

Gressard and Loyd (1985) presented a Computer Attitude Scale (CAS) consisting of 30 Likert-type items and subjected it to 3 validation studies. Although the ERIC abstract comments that it "appears to be a convenient, reliable, and valid measure of computer attitudes", this scale helped only to suggest a general sense of direction for some of the perception statements in the instrument. The individual items were not considered sufficiently specific for this study.

(A general listing of items presented in these articles and others is provided in Appendix E.)

However, six entries in the work "Educational Research, Methodology, and Measurement: An International Handbook", edited by Keeves (1988) provided useful advice for the

compilation of the instrument and the subsequent analysis of the data. These were written by Walker and Burnhill (pp 101 - 107), Rosier (pp 107 - 113), Anderson (two; pp 421 - 426 and 427 - 428), Wolf (pp 478 - 48), and Cooper (pp705 - 710).

Once the questions proposed for use in the instrument had been identified and drawn up, the layout and sequence were considered in the light of the coding of the responses and their possible influence on one another. The introductory letter was then written, and the prototype questionnaire presented to and discussed with experts. Certain changes were made, and a pilot version was pretested on a representative range of teachers. Final changes and adjustments were made after this, and the instrument was then printed in its final form for distribution to the seven schools involved.

The open-ended Question 1 was placed there to prevent as far as possible any influence on the response by ideas suggested in the rest of the questionnaire.

The 19 Likert-type statements which followed (questions 2 to 20) were drawn up following the approaches suggested by Anderson (in Keeves, op cit) and Abdel-Gaid (op cit). After the consultation-with-experts phase and the

resultant changes and amendments, eight of the nineteen statements were classified as being positively posed (numbers 3, 5, 8, 11, 15, 16, 18, and 20), eight as negatively posed (numbers 2, 4, 6, 7, 10, 12, 14, and 17), and three as likely to have a divided response from the respondents (numbers 9, 13, and 19).

5.3 The composition and limitations of the sample.

The sample consisted of the teaching staff of seven high/secondary schools in the northern suburbs of Johannesburg. Five schools were co-educational government schools, one a boys-only government school, and one a boys-only private school. There were 339 teachers in total on the staff of these schools, and this number of questionnaires was distributed to the seven schools at the beginning of the third term (August) 1991. A week later the completed questionnaires were collected at the schools. These numbered 224, or 66% of the total sample. 10 questionnaires were discarded in the coding process because they had been very inadequately completed, resulting in a final number of 214, or 63.1%.

Since only white teachers of predominantly white urban pupils from a relatively limited geographical and socio-economic area were involved, the results of the survey cannot be regarded as relevant nationally; but in

that these schools and their parents are more likely than most to have the financial resources to own and be using computer equipment, they could be regarded as in the forefront of likely computer use in the future, both at school and in the home.

6.4 The construction and coding of the database, and statistical presentation of the data.

6.4.1. There were 214 respondents, each of whom furnished a record in the database. The records were labelled as follows:

a. Each of the seven schools involved in the survey was allocated a batch letter in order from A to G, as the completed questionnaires were collected;
b. The questionnaires from each school were marked with its batch letter and numbered in sequence from 1 to n;
c. Each respondent was thus given a combination of a letter and a number, which was used to label his/her record in the database. (The first of the 214 records is thus labelled A1; the last one is G26.)

6.4.2. From each of the respondents the questionnaire elicited 145 answers or responses, each of which required a field in the database. These fields were labelled according to a code (see Appendix A), as

follows:

a. Each of the responses was given an abbreviated code-name, consisting of the number of the question, together with a letter or letters to identify the contents of the response concerned within the context of its question;

b. These code-names were then used as the names for the 145 fields in the database. (The code/fieldname for question 1, for example - "What is the first word or phrase that comes to mind when you hear the word computer?" - is 01w.)

6.4.3. To facilitate calculations, each response was coded or classified according to predefined numerical scales (again, see Appendix A), and only the appropriate number was entered into the relevant field in each record.

6.4.4. The database itself was then divided into eight separate spreadsheet tables for ease of management. These eight tables grouped the responses conveniently according to both their contents and the order of the questions in the instrument. (See Appendix C.)

6.4.5. Means, frequency distributions, rankings, standard deviations and variances were calculated for each

field. These statistics were then transferred, if and wh[illegible] valid, to the original survey questionnaire format and laycut for ease of reference and ready comparison. The result is presented in Appendix A.

6.4.6. Graphs were also drawn of the responses to most questions from 1 to 43, and a chi square test was done on the responses to question 40. The graphs are either presented where relevant in the course of Section 7 of this report, or provided for reference in Appendix D.

SECTION 7. ANALYSIS OF THE DATA - THE FINDINGS OF THE RESEARCH.

This section is divided into four parts, taking in turn each of the three purposes of the research, and concluding with some general remarks.

7.1 The first purpose - perceptions.

This was the most important one in terms of the title of this study - to investigate how teachers perceived computers and their uses in education. The questions concerned were 1, 2 - 20, 21, 23 - 27, 29, 30, 40, 42, and 59. The responses are discussed in five groupings:

7.1.1. Grouping One - Questions 1, 21, 29, 30, 59.
7.1.2. Grouping Two - Questions 2 to 20.
7.1.3. Grouping Three - Questions 23 to 27.
7.1.4. Grouping Four - Question 40.
7.1.5. Grouping Five - Questions 42 and 43.

7.1.1. Grouping One - Questions 1, 21, 29, 30, 59.

Question 1 (see graph 1 on page 44) was open-ended, but the responses were coded in three categories. Questions 21, 29, 30, and 59, on the other hand, each offered specific sets of categories for respondents to choose from

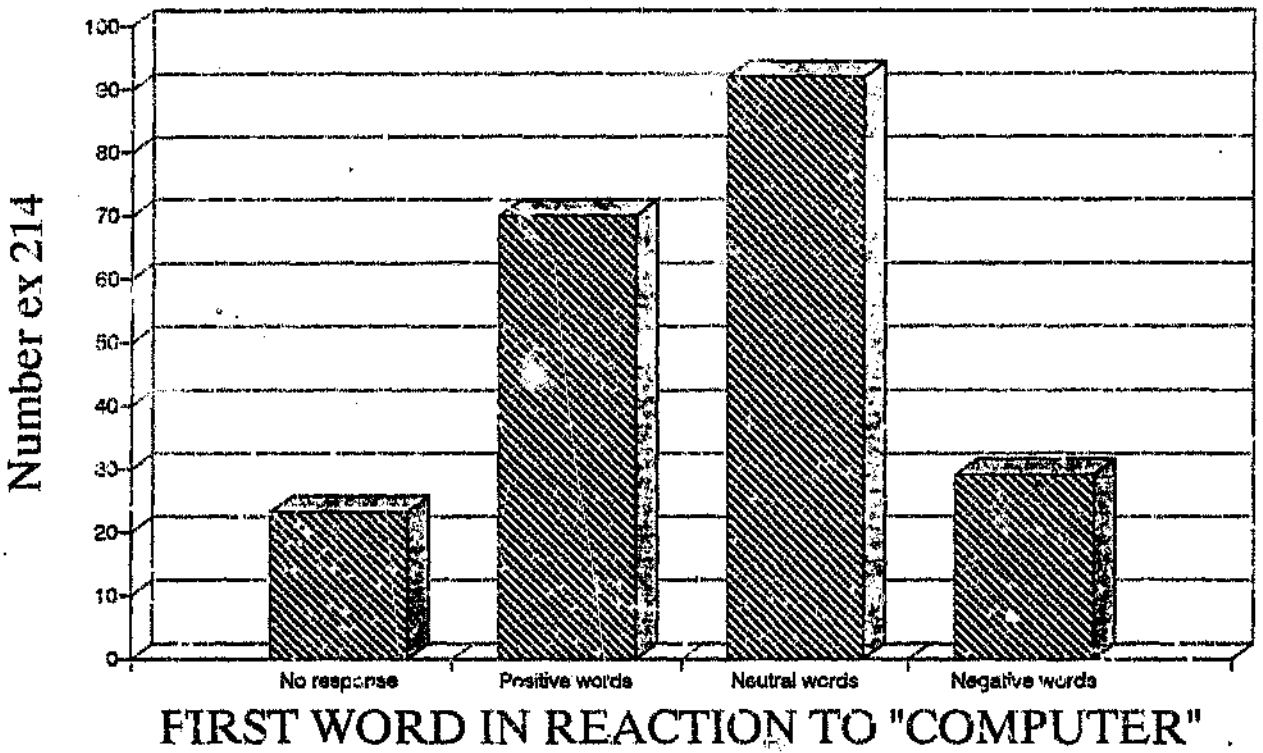
in their responses. The categories varied, according to the perceptual perspective under consideration.

In Question 1 there was a 10.7% nil response (the placing of the question at the beginning of the instrument, before an explanation, might have contributed to this); of the other responses, 32.7% were construed as positive, 43.0% as neutral, and 13.6% as negative.

In **Question 21 (see graph 2 on page 44)**, on the other hand, the respondents were asked to categorise their own perception of computers in general, under four headings. 79.0% placed themselves in the positive category. There was no "neutral" category in Question 21, but it is significant that not one respondent chose "negative". Approximately 21%, or one in five of the respondents, thus indicated doubts of some sort about computers in general.

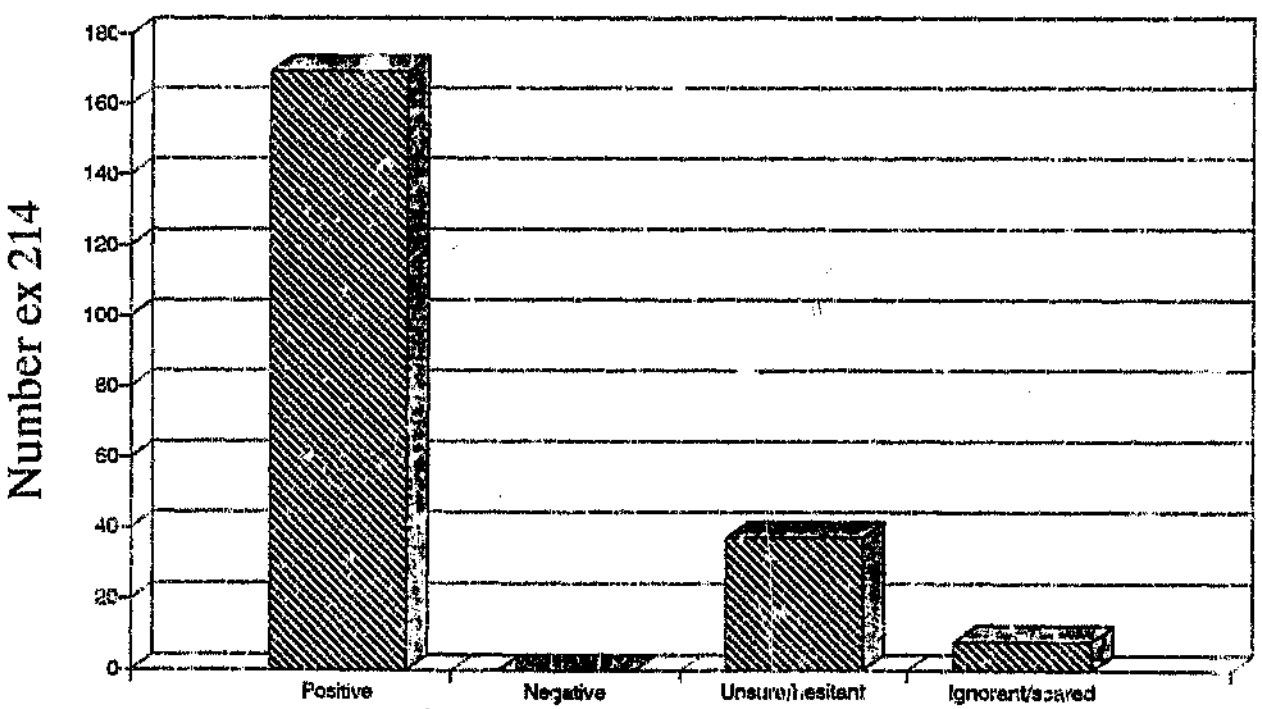
In **Question 29 (see graph 3 on page 45)** respondents were asked to choose a category which best described their attitude to computers in education. 50.9% were unreservedly enthusiastic, and a further 37.4 % were enthusiastic but with reservations. Only 1.9% opted for "Indifferent", and 9.4% chose "Uninitiated". There were again no responses at all in the two negative categories.

GRAPH 1
(Question 1)



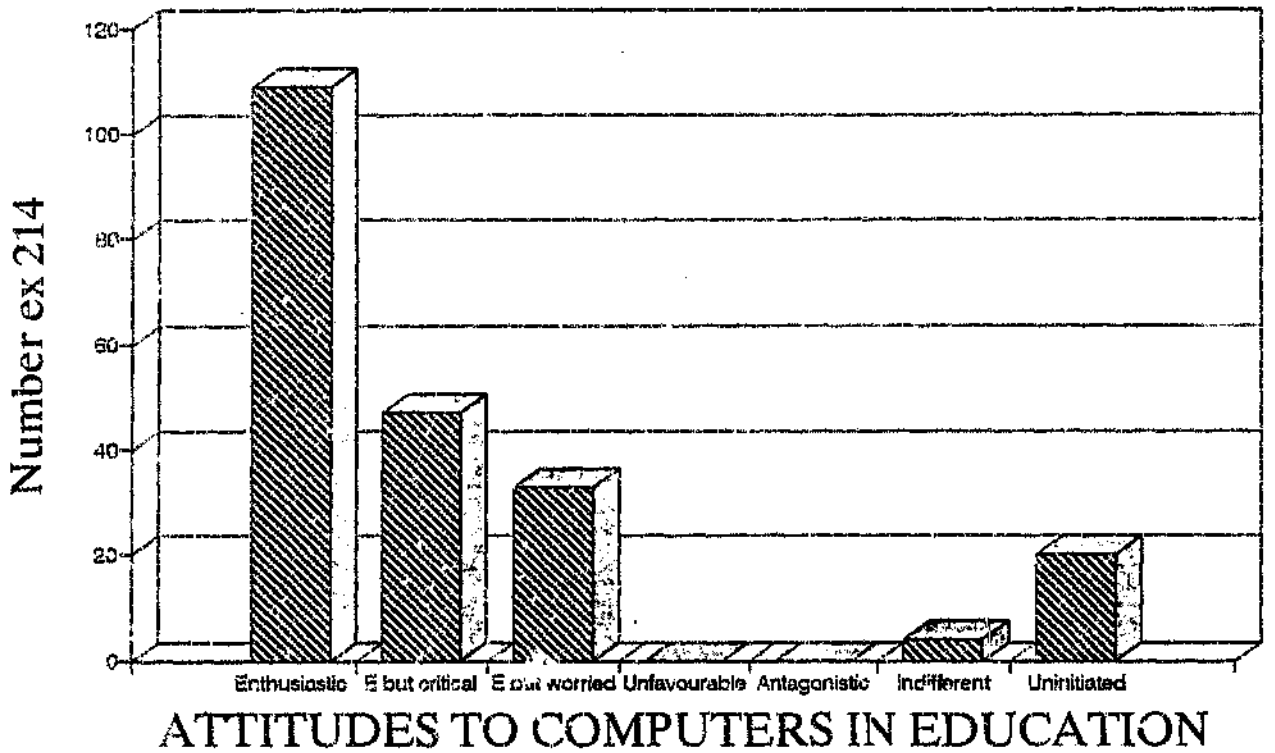
FIRST WORD IN REACTION TO "COMPUTER"

GRAPH 2
(Question 21)

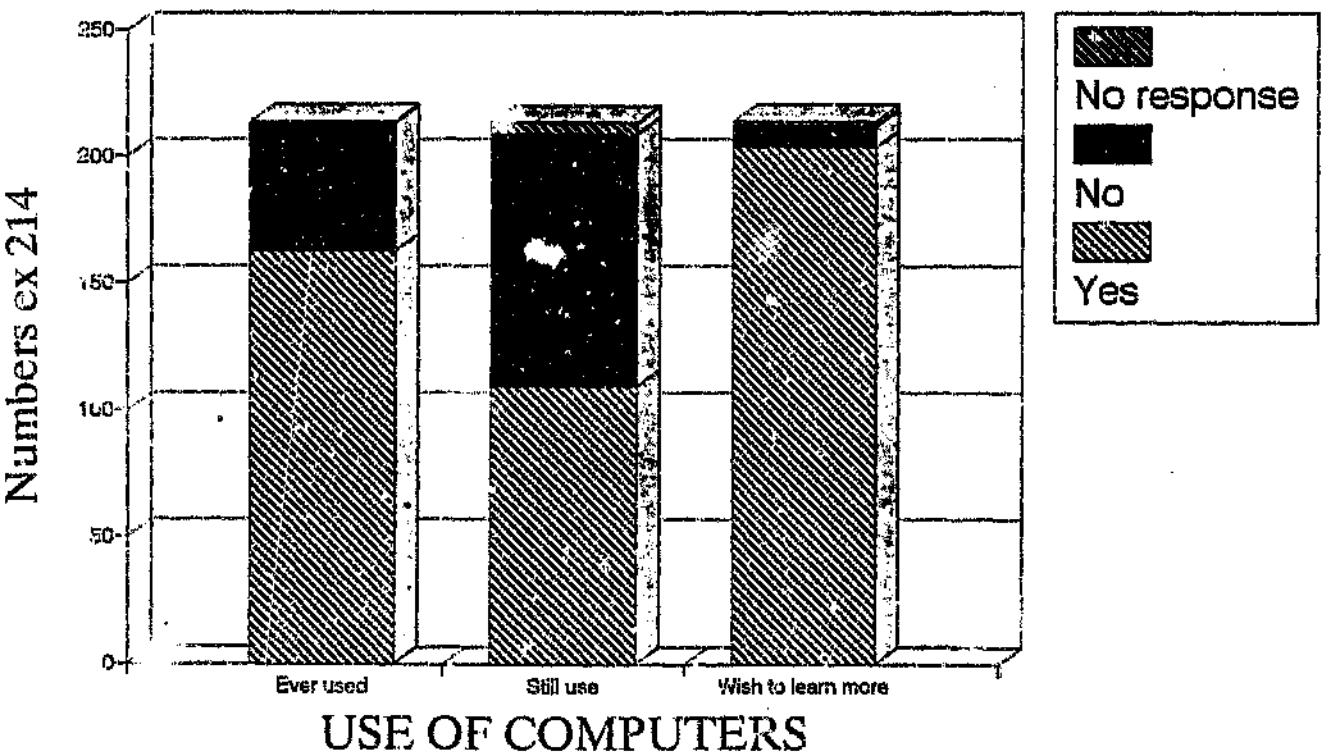


PERCEPTIONS OF COMPUTERS IN GENERAL

GRAPH 3
(Question 29)



GRAPH 4
(Question 30)



Question 30 (see graph 4 on page 45) was included to find out what proportion of the sample had ever used a computer, what proportion still did so, and how much interest there was in the sample at large in learning more about how to use computers. Of the respondents, 75.7% had used a computer at some stage, 50.9% still did so, and 94.9% were interested in learning more about how to use one. (The exact nature of the use referred to will be considered under 7.2.)

The responses to Question 59 provided another general comment on the respondents' perception of computers, this time from a parent's perspective. Exactly half of the 214 respondents said they had children (see Question 54). None of these 107 (and a further 29 who did not have children, but nevertheless answered the question) felt unhappy about their children using computers - 92.7% were happy, and 7.3% neutral.

These results suggest a preliminary finding that the respondents were positive about the general concept of computers and their uses in education. None were negative, although some had reservations or were non-committal. However, these perceptions were based on varying levels of experience of computer use - 50% used one, 25% had never used one, and the other 25% had not continued with their use. The nature of this experience and use was at this

stage unspecified; the issue will be raised again in 7.4.

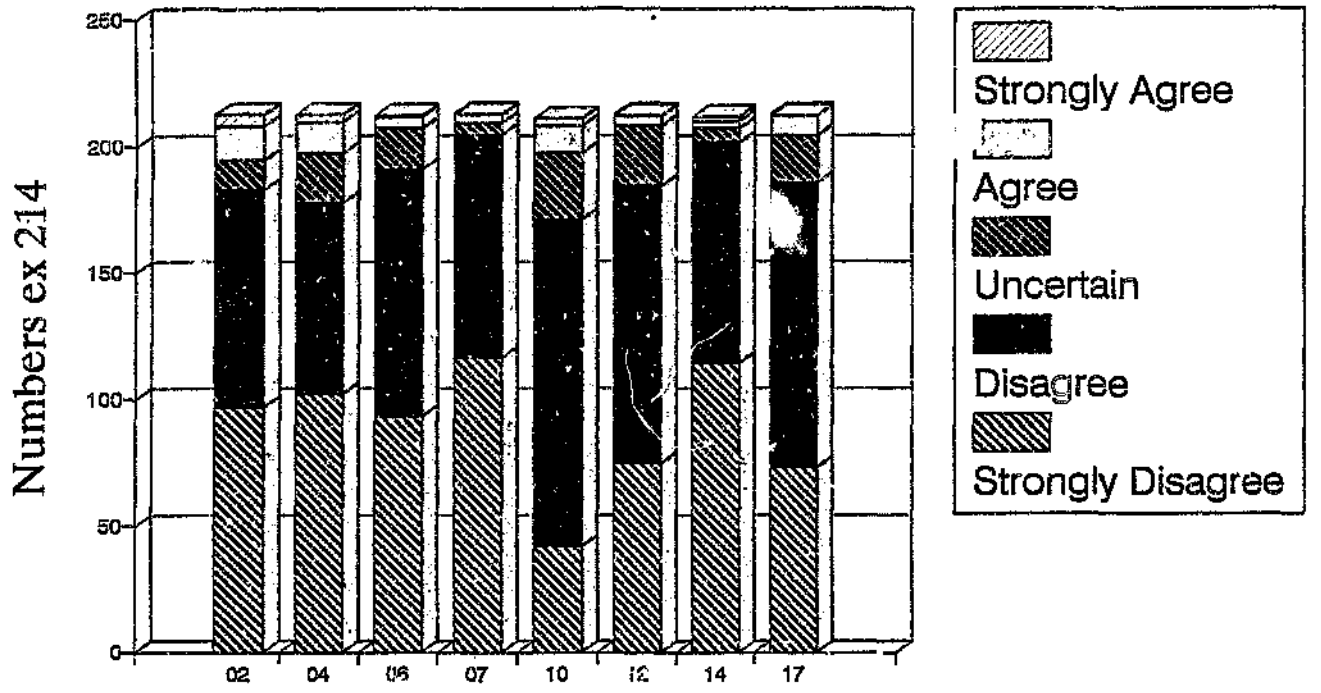
7.1.2. Grouping Two - Questions 2 to 20 (Graphs 5-7).

These nineteen questions were the Likert-type statements, drawn up and tested as described in section 6.2 above.

The responses to sixteen of these nineteen statements, summarised in Graph 5 and 6 on page 48, indicate that the respondents' perception of computers in education as explored in these questions followed closely the pattern identified by experts in terms of both the negatively and the positively worded statements. The responses tended overwhelmingly to strongly-disagree or disagree with the eight statements identified as negative, and to strongly-agree or agree with those eight identified as positive. (The calculated means of the numerically-coded responses to these sixteen questions, as presented in Appendix A, support this finding.)

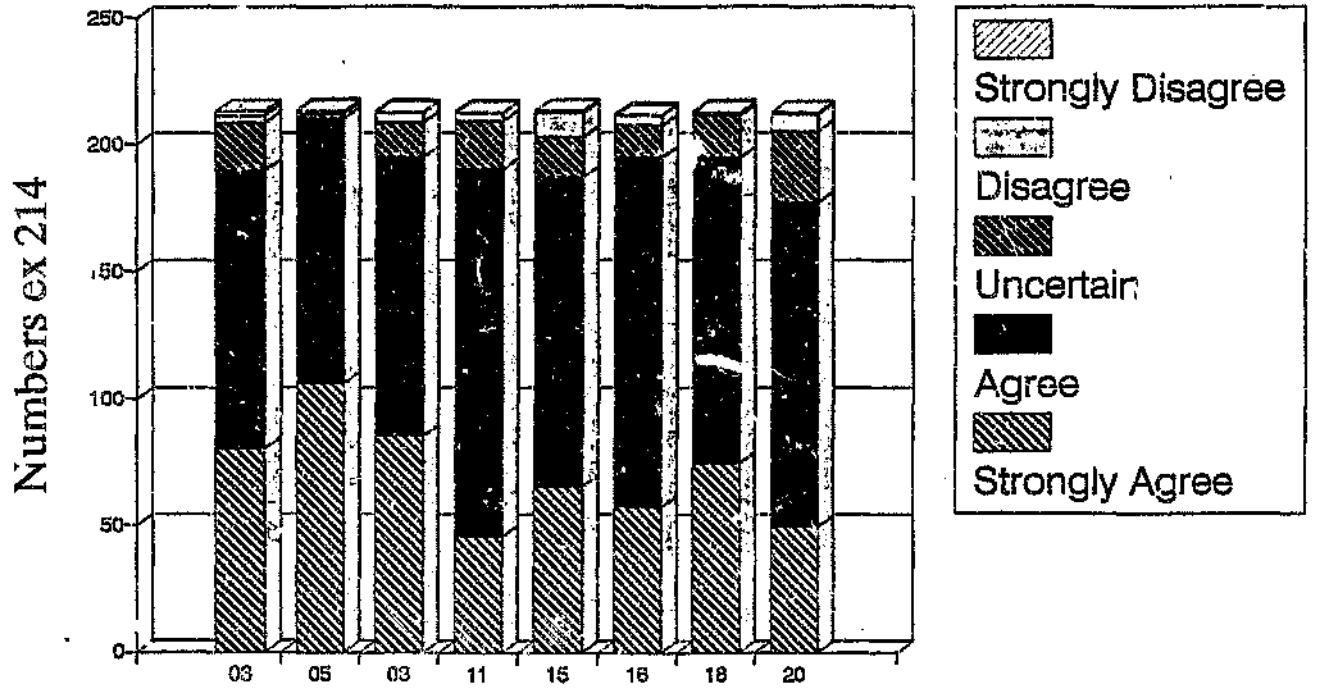
It was anticipated that there would be less consensus in the responses to the other three statements (Questions 9, 13, and 19), and this is borne out in Graph 7 (see page 49).

GRAPH 5
(Questions 2,4,6,7,10,12,14,17)



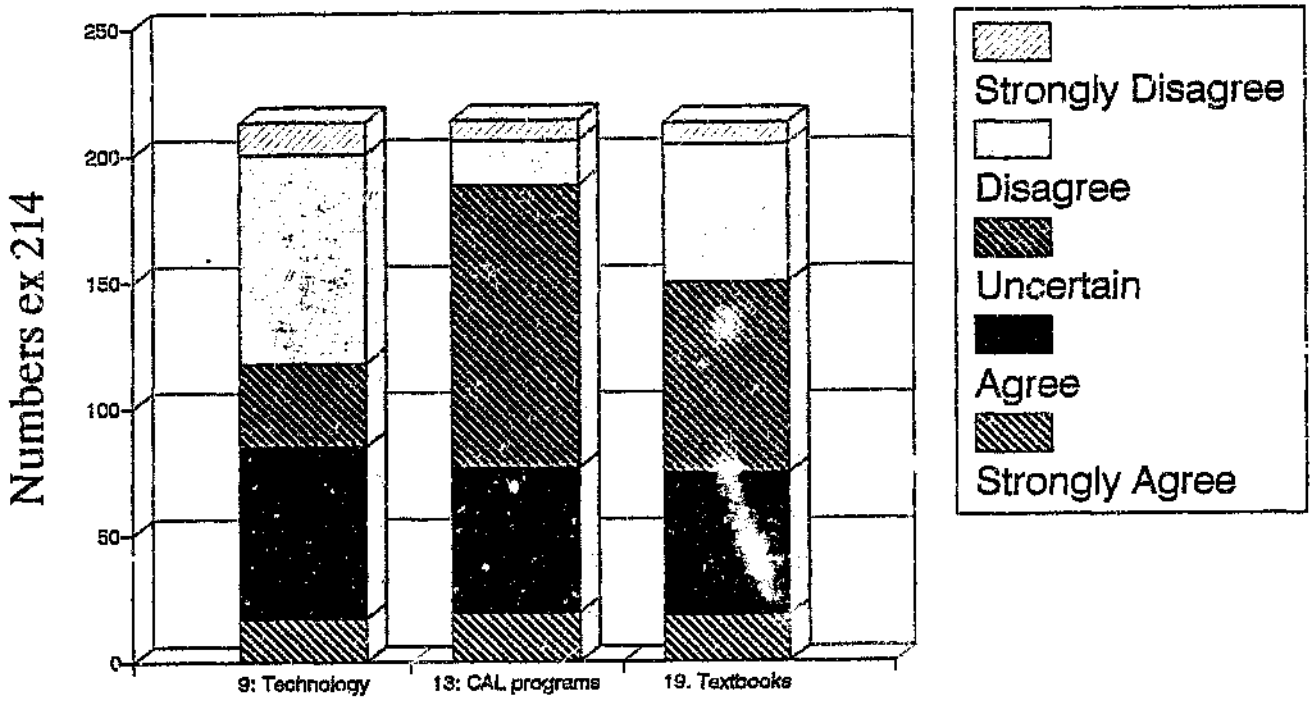
NEGATIVELY-POSED LIKERT STATEMENTS

GRAPH 6
(Questions 3,5,8,11,15,16,18,20)



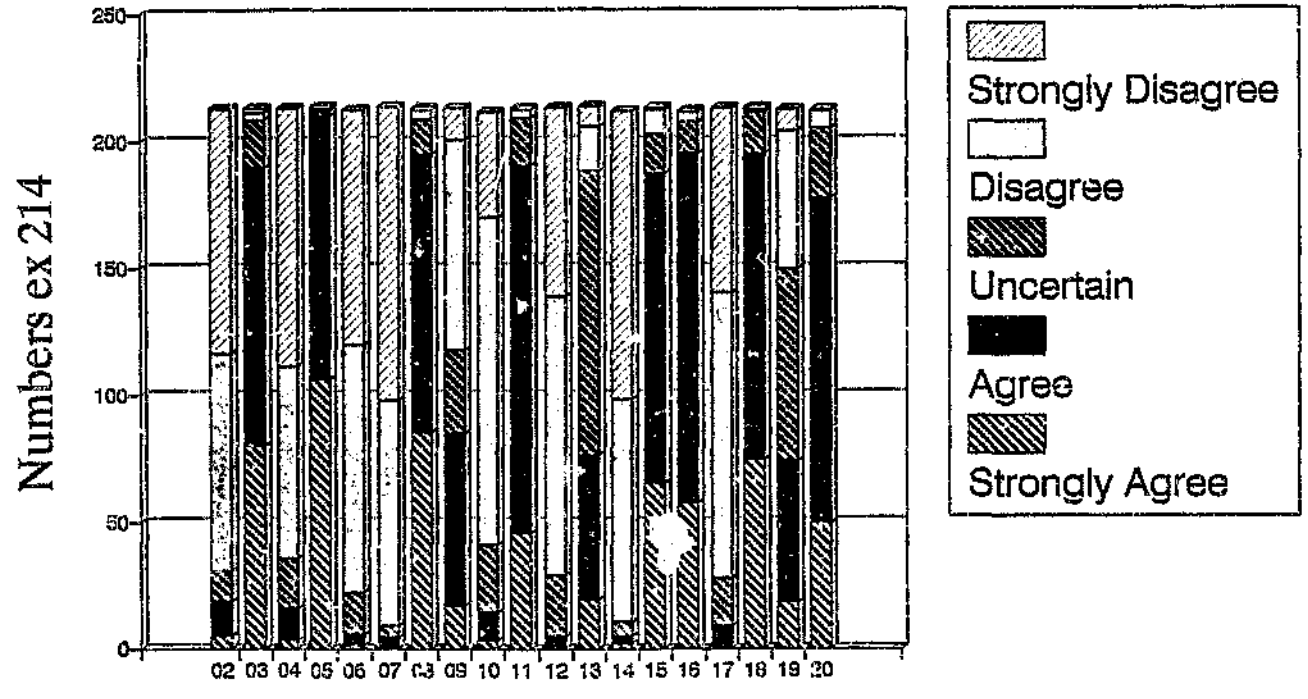
POSITIVELY-POSED LIKERT STATEMENTS

GRAPH 7
(Questions 9,13,19)



DIVIDED-RESPONSE LIKERT STATEMENTS

GRAPH 7A
(All 19 Likert-type Statements)



Questions 2 - 20

i) In Question 9 the respondents were fairly evenly divided in favour of (39.7%) and against (44.9%) the statement ("Teachers should understand the technology of how a computer works") with 15.4% uncertain. With hindsight, it is unlikely that all respondents understood the term "technology" in the same way.

ii) These three statements also included the only two of the nineteen in which there was a really significant proportion of "Uncertain" responses. There was a great deal of uncertainty ((52.3%) on the statement in Question 13 ("There are good computer programs available in South Africa which would be useful in teaching my subject"), with a further 35.5% agreeing and 12.2% disagreeing with the statement. This seems to reflect a similar situation to that described in section 3.3 of this report.

iii) The other statement on which there was much uncertainty (35.5%) appeared in Question 19 ("Computers will be the text-books of the future"). This question also followed the response pattern of question 9, in that the support outside the area of uncertainty was fairly evenly divided in favour of (34.6%) and against (29.9%) the statement. Again, the response would depend to a large extent on the respondent's current reliance on, and manner of use of, textbooks in the teaching/learning situation.

(A graph reflecting the responses to all 19 Likert-type statements in the order in which they were presented in the instrument is also provided, as graph 7A on page 49.)

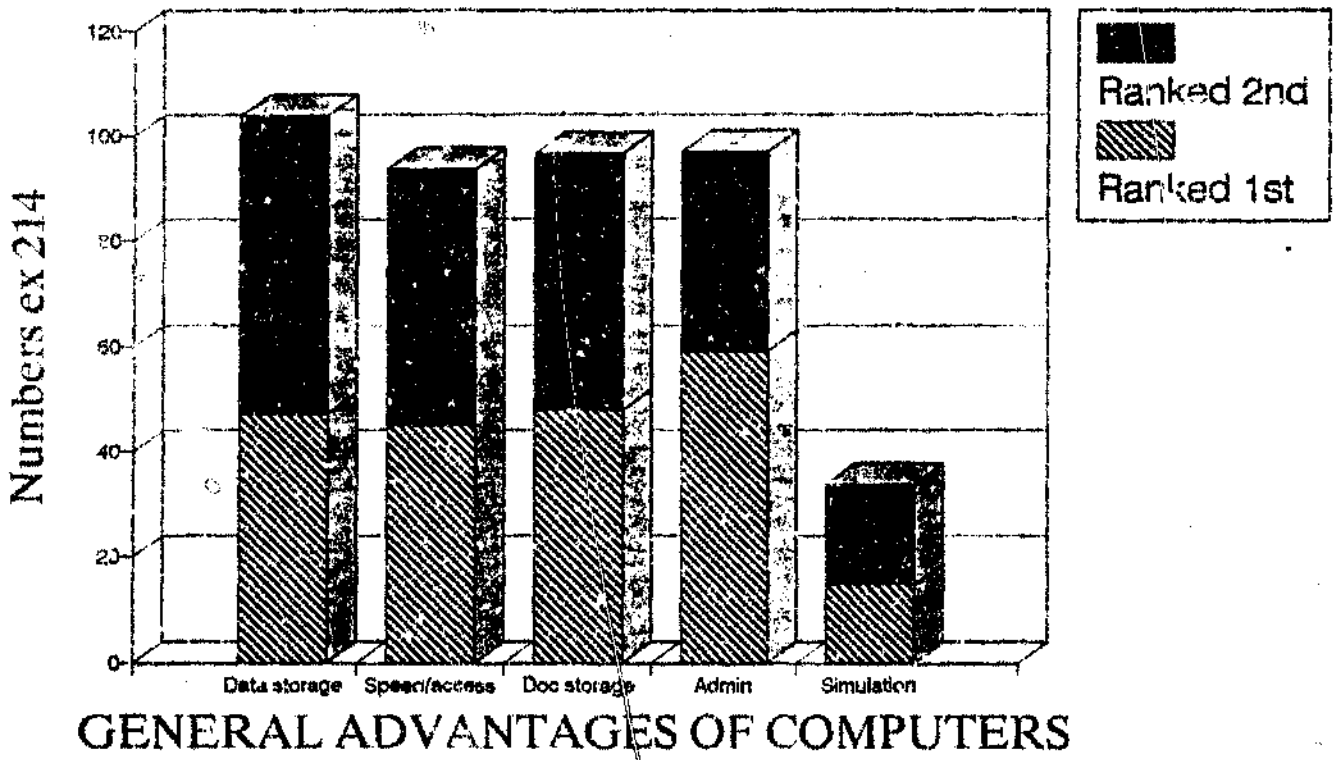
In that the responses to these 19 statements were so strongly consistent, the perceptions posited in the statements can be reasonably assumed to reflect accurately those of the great majority of the respondents. The statements and their responses can thus be regarded as useful indicators of the perceptions generally held by teachers.

8.1.3. Grouping Three - Questions 23 to 27 (Graphs 8-11).

The ranking exercises carried out in these questions revealed several points worthy of comment.

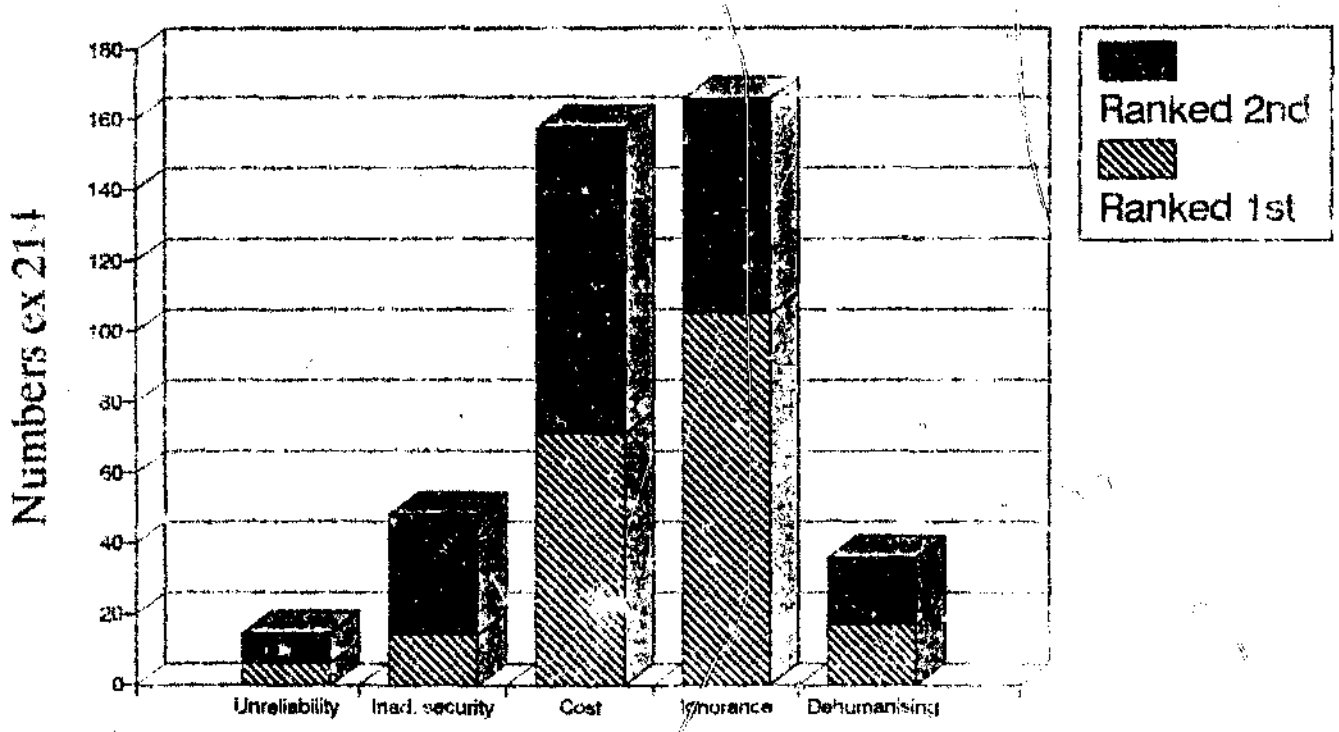
(It should be noted first that the means and resulting rankings presented in section 7 of each of the categories in these five questions were calculated on all five ranking levels, as selected individually by the respondents. The graphs presented here, however, include only the first and second ranking levels in each category. These are sufficient to provide in each case a very definite indication of the character of the responderts' perceptions.)

GRAPH 8
(Question 23)



GENERAL ADVANTAGES OF COMPUTERS

GRAPH 9
(Question 24)



GENERAL DISADVANTAGES OF COMPUTERS

In Question 23 (see graph 8 on page 52), four of the five suggested general advantages of computers were ranked fairly evenly as a combination of first and second by the respondents, with the fifth (the simulation of problems) receiving much less attention. The response to Question 41s shows that 57.5% of the respondents claimed to know about simulations before completing the questionnaire; 40.2% did not, and 2.3% did not respond. This fifth ranking in Question 23 can thus be regarded as a reasonably informed response.

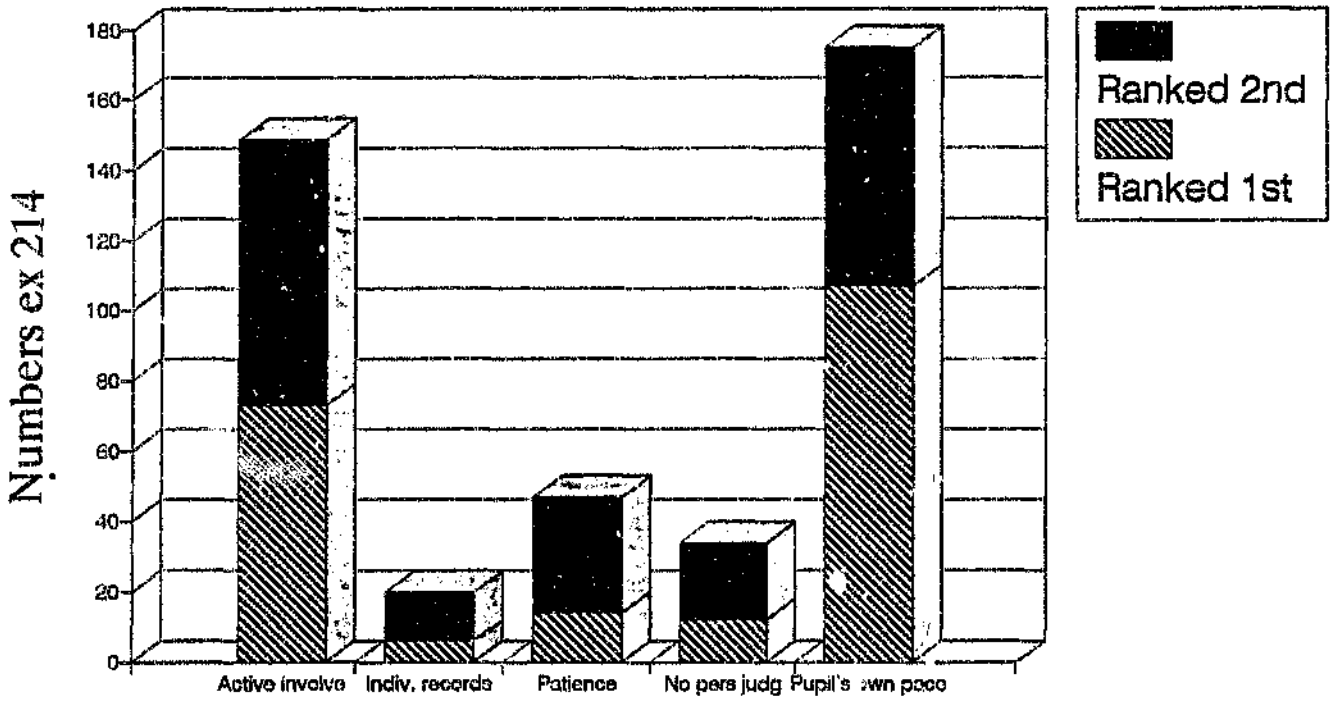
Somewhat ironically, the use of simulation is currently receiving a great deal of attention in industrial and commercial training programs, and could well find its way into high-school education, particularly that with a vocational orientation, in the not-too-distant future.

In Question 24 (see graph 9 on page 52), cost and ignorance were clearly identified as the two major areas of concern in terms of the five suggested general disadvantages of computers. (The difficulties of industry and commerce with data security and the reliability of equipment did not seem to really concern the respondents, nor did they seem unduly perturbed by the notion that computers might have a dehumanising effect on the data they process, or on their users.)

i) Taking the issue of cost first ("Computers cost too much"), the ranking here (73.8% of the respondents ranked it either first or second) should be compared with the response to Question 10 ("Computers are too expensive to justify their purchase as teaching tools") where 60.3% disagreed, and a further 19.6% strongly disagreed. A possible explanation is that respondents might have associated the cost in Question 10 with the education authorities or the school, whereas the cost in Question 24 might have been personally assumed. (The kind of cost - hardware or software or training, for example, or even time - was not considered here.)

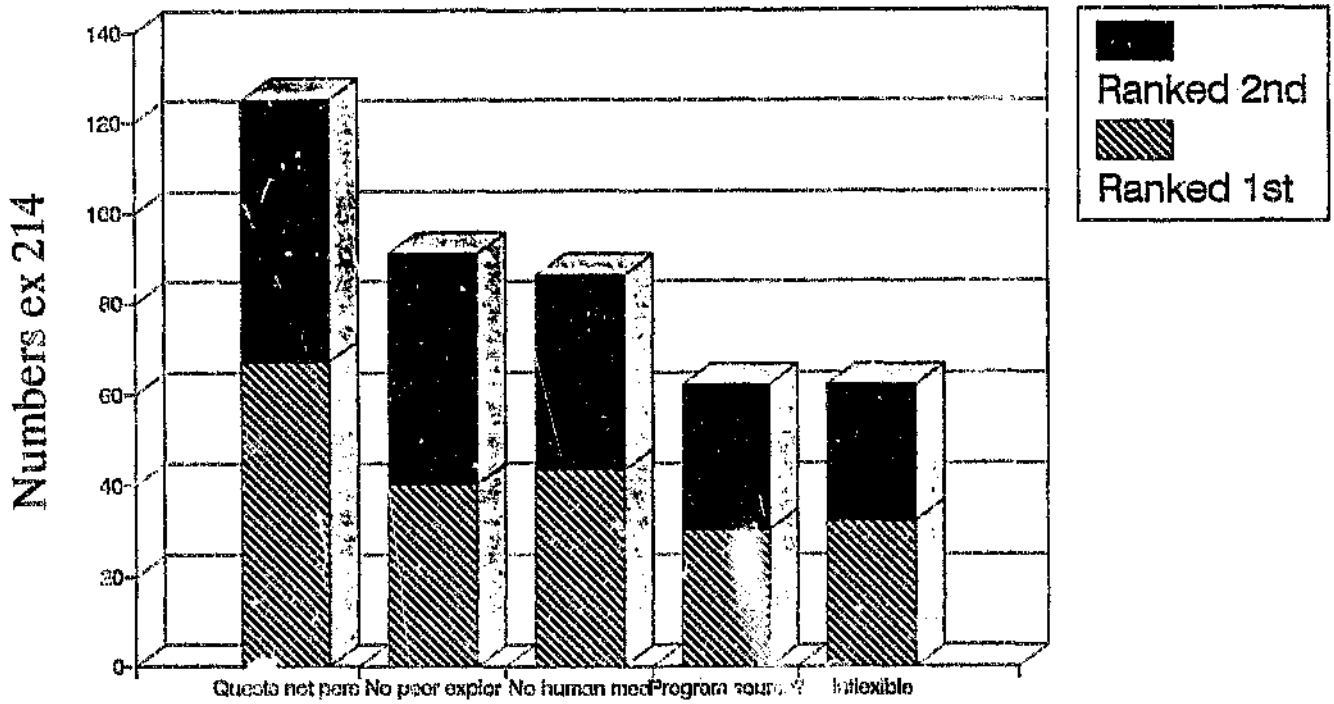
ii) "Not enough people know what's going on" was perceived as the greatest disadvantage of computer use in general, with 77.6% of the respondents ranking it either first or second. The nature of the knowledge, experience, and use of computers of the respondents in this survey as indicated in their responses to various other questions, and will be discussed later in this report. However, this perception has obvious and important implications for any recommendations which might develop from the findings of this research.

GRAPH 10
(Question 25)



ADVANTAGES OF CAL (COMP-ASSTD LEARNING)

GRAPH 11
(Question 26)



DISADVANTAGES OF CAL (COMP-ASSTD LEARN)

Turning to the respondents' perceptions of computers as a medium of instruction (**Questions 25 and 26 - see graphs 10 and 11 on page 55**), there was considerable support for the idea as stated in Question 18 ("Computers as a medium of instruction have great potential") with which 34.6% strongly-agreed and 56.5% agreed. But only 30 of the 214 respondents claimed in Question 35 to be involved in computers as a medium of instruction, and when they were asked in Question 37 to name the programs they used, only 16 actually did so.

However, it is significant to note how pupil-oriented the respondents' rankings were in terms of the possible advantages (graph 10), and that they were not concerned with one of the computer industry's perceived advantages of computers in education - individual records and record-keeping.

(The comparatively low ranking received by "patience" and "no personal judgements" might imply that the respondents did not see themselves as lacking in these areas; as a result they did not regard these two qualities as particular advantages of computers in education.)

Apart from showing the same over-riding concern with pupil-oriented factors, Graph 11 suggests also an important level of concern with the source and nature (and

thus by implication the content and presentation) of the programs.

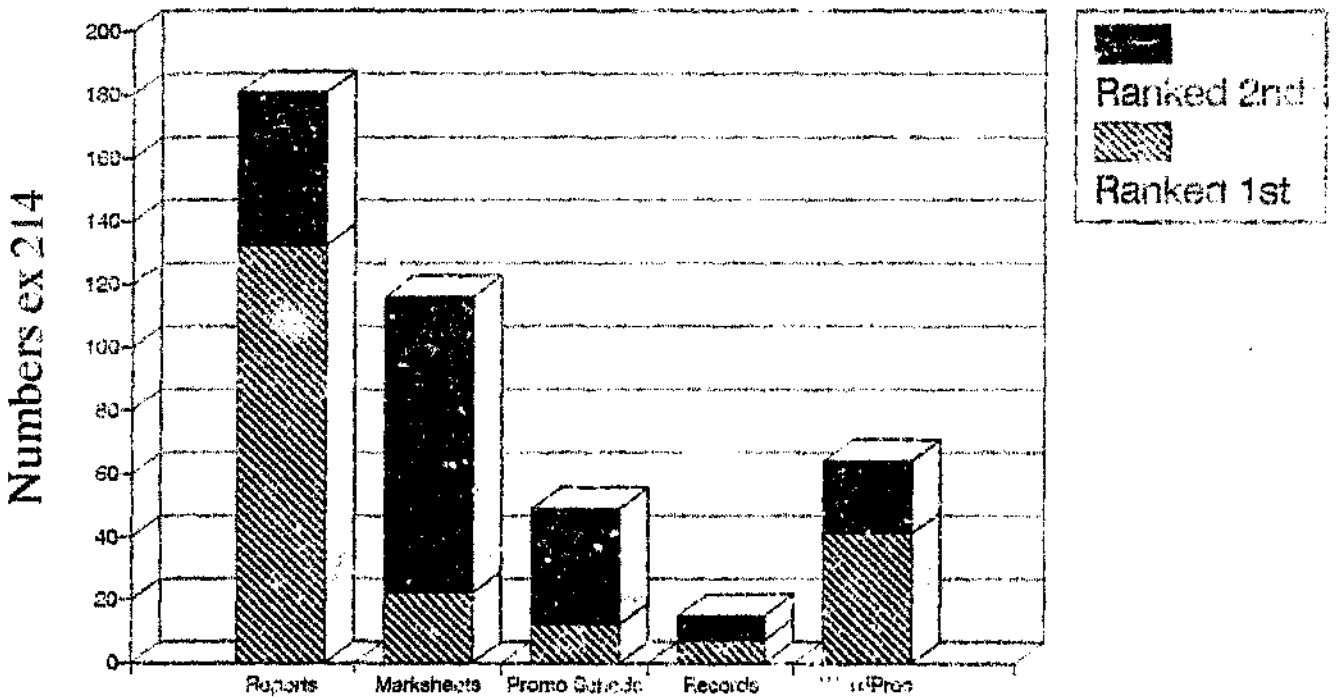
Question 27 (see graph 12 on page 58) asked respondents to rank in order of importance various administrative uses of computers at their own schools.

i) 84.6% of the respondents selected as first or second choice the value of the relief which the computer offers from the chore of arithmetic calculations and "form-filling-in" which reports tend largely to represent. (The issue of possible distancing, due to the absence of the personal touch, was not raised by the teachers.)

ii) Record-keeping was largely discounted, but the value of computerised marksheets was recognised as a second choice by 43.9% of the respondents.

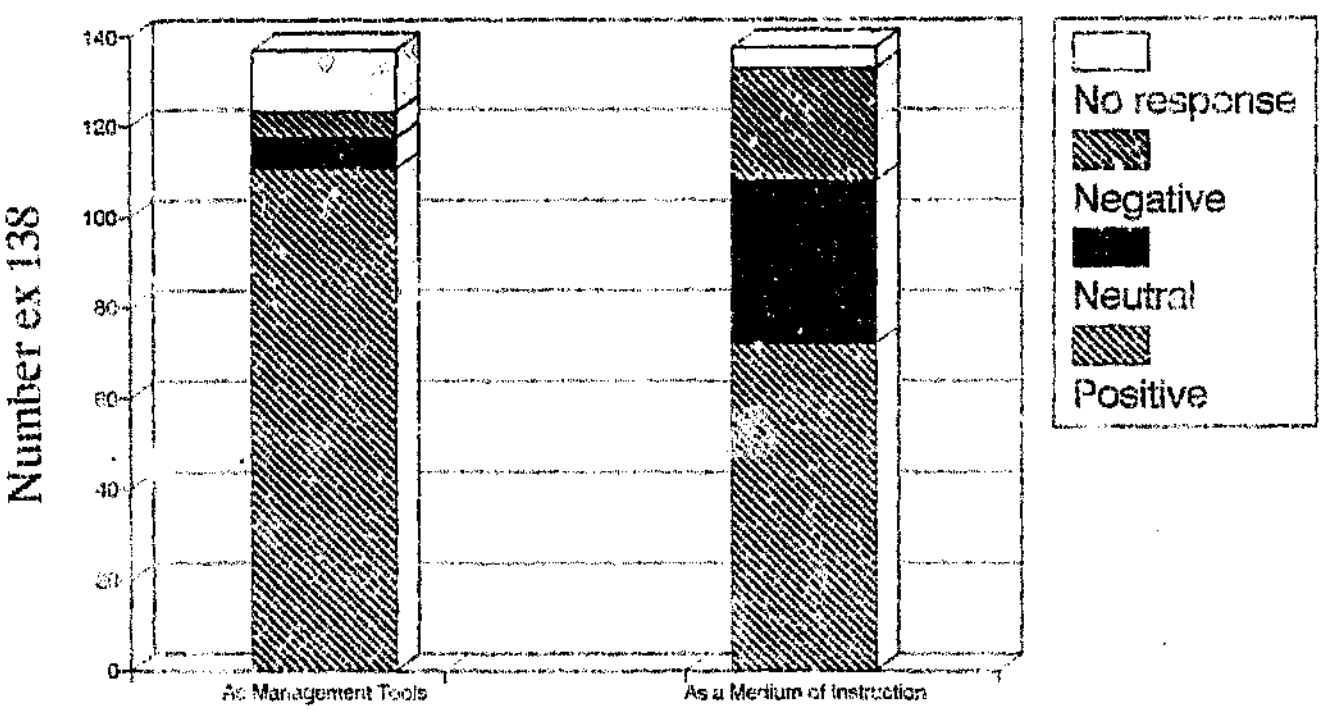
iii) The value of having promotion schedules produced by computer would be really apparent only to teachers in the more senior posts, or to those respondents who had had the experience of producing these documents by hand.

GRAPH 12
(Question 27)



ADMINISTRATIVE USES OF C' .PUTERS

GRAPH 13
(Question 40)



FEELINGS ON USE OF COMPS IN TWO AREAS

iv) The relatively low ranking of word-processing in this question (only 29.9% ranked it first or second) is in curious contrast with the responses to Questions 28, 36, and 42. In Question 28 (familiarity with applications) word-processing ranked first, with 60.3% of the respondents claiming to be either proficient in, or able to use, this application. It also ranked first in Question 36 ("I switch on a PC most often for ..."), and was second only to "Administration (reports, marks etc)" on the rankings of uses for computers at schools in Question 42.

Perhaps, although they claimed to be able to use the application, or knew that it was being used at their schools, respondents were not yet fully aware of just how valuable word-processing could be to them administratively in terms of the management, updating, and proofreading of documents such as schemes of work, proforma documents, subject policies, notes, worksheets, tests, exams, and so on.

8.1.4. Grouping Four - Question 40 (Graph 13).

In **Question 40 (see graph 13 on page 58)** respondents were asked to write two short sentences stating how they felt about using computers in two areas in their teaching work; a) as management tools; b) as a medium of instruction.

(Only respondents who actually used computers were asked to respond to this question. 138 - 64.5% - did so. This is at odds with the response in Question 30, in which only 109 respondents - 50.9% - said that they still used a computer.)

The responses were classified (separately in each of the two areas) as negative, neutral, or positive. Whereas 80.4% of the 138 respondents were positive about the use of computers as management tools, only 52.2% were positive about their use as a medium of instruction. 5.1% were neutral in the first area, compared with 26.1% in the second. Only 4.4% of the respondents were negative about the use of computers as management tools, but 18.1% were negative about their use as a medium of instruction.

These responses suggested a fundamental difference in support for the use of computers in education in these two areas, with important implications for the findings of this report. A Chi-square test was therefore carried out to establish whether the responses in area a) were in fact significantly different from those in area b).

The null hypothesis was that the classification and area variables were independent. χ^2 was calculated as 38.3. The number of degrees of freedom with three classifications

and two areas was 2. The significance of χ^2 = 38.3 when df = 2 was then determined by reference to the tables, which showed that χ^2 crit = 9.210 < χ^2 calc = 38.3.

The null hypothesis was thus rejected; the variables were not independent, and the responses were significantly different. This finding that there was a great deal more support for the use of the computer as a management tool than as a medium of instruction, among those respondents who claimed that they actually used computers, will be further considered under 7.4.

7.1.5. Grouping Five - Questions 42 and 43 (Graphs 14-15).

Question 42 (see graph 14 on page 63) was included in the instrument to find out what the respondents knew about what the computers at their school were being used for. Thirteen categories of use were supplied, for "Yes", "No", or "Don't know" responses.

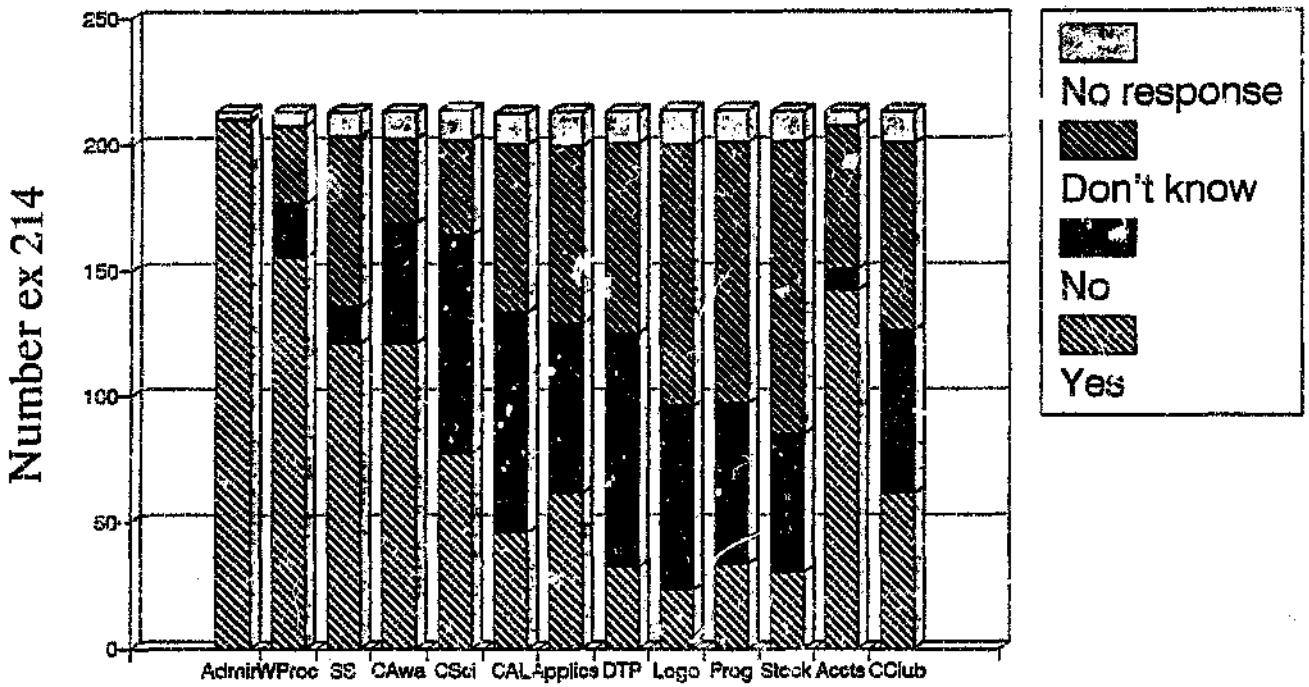
The responses were so contradictory within the individual schools (see Appendix D - graphs 14A to 14G) that the question and its initial graph are perhaps more valuable as an indication of perception than of knowledge. The same applies to **Question 43** (see graph 15 on page 63), on the number of computers in each of the seven schools. Question 42 will be looked at again under 7.2 in conjunction with

other questions, such as 28 and 36.

Overall, as graph 14 indicates, Administration (with a 98.1% "Yes" response) was an almost universally-recognised use for computers at the schools in the study. This was followed by Word-processing (72.4% "Yes"), and the preparation and sending out of Accounts (66.4%). Spreadsheets and Computer Awareness shared fourth place at 56.5%, and these were the only five of the thirteen suggested uses to be recognised positively by the majority of respondents. The remaining eight had "Yes" responses ranging from 36.0% (Computer Science), through 28.5% (Use of Standard Applications in School Subjects, and Computer Club), to 21.5% for CAL, and down to 10.8% for Logo.

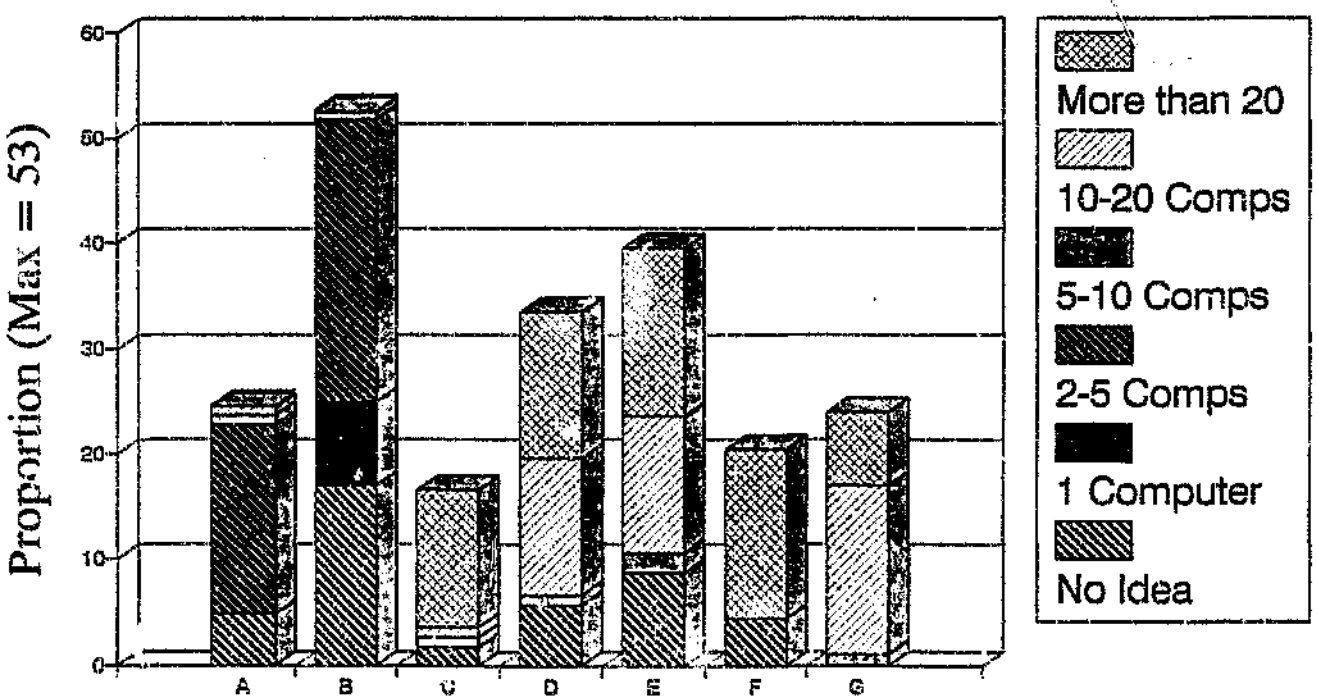
It is impossible to tell from graph 14 where the "No" and "Don't know" responses originated, in what proportion, and whether there was any consistency at the individual schools. For this reason the responses within each of the seven schools were plotted separately (see graphs 14A to 14G in Appendix D). The graphs indicate a remarkable diversity of knowledge or awareness, both within the individual schools and among them, as to what their computers were and were not used for.

GRAPH 14
(Question 42)



COMP USE: 13 CATEGORIES, ALL 7 SCHOOLS

GRAPH 15
(Question 43)



NO OF COMPS (BY SCHOOL, ACC. TO RESPS)

This apparent confusion (for want of a better word) is compounded by the responses to other questions in the instrument, specifically Questions 22, 28 and 35-38, which are considered under 7.2; Question 43 (see graph 15 on page 63) is indicative of a similar confusion.

[For teachers not to be sure, as this response suggests, of what resources (of any sort) are available at their own school, or in what quantity, is something of an indictment. With regard to computers and this study, it is particularly so if considered in conjunction with the sentiments or claims indicated by the great majority of respondents in response to questions such as 5, 8, 11, 15, 20, 21, 22, 29, and 30.]

7.2 The second purpose - knowledge and experience.

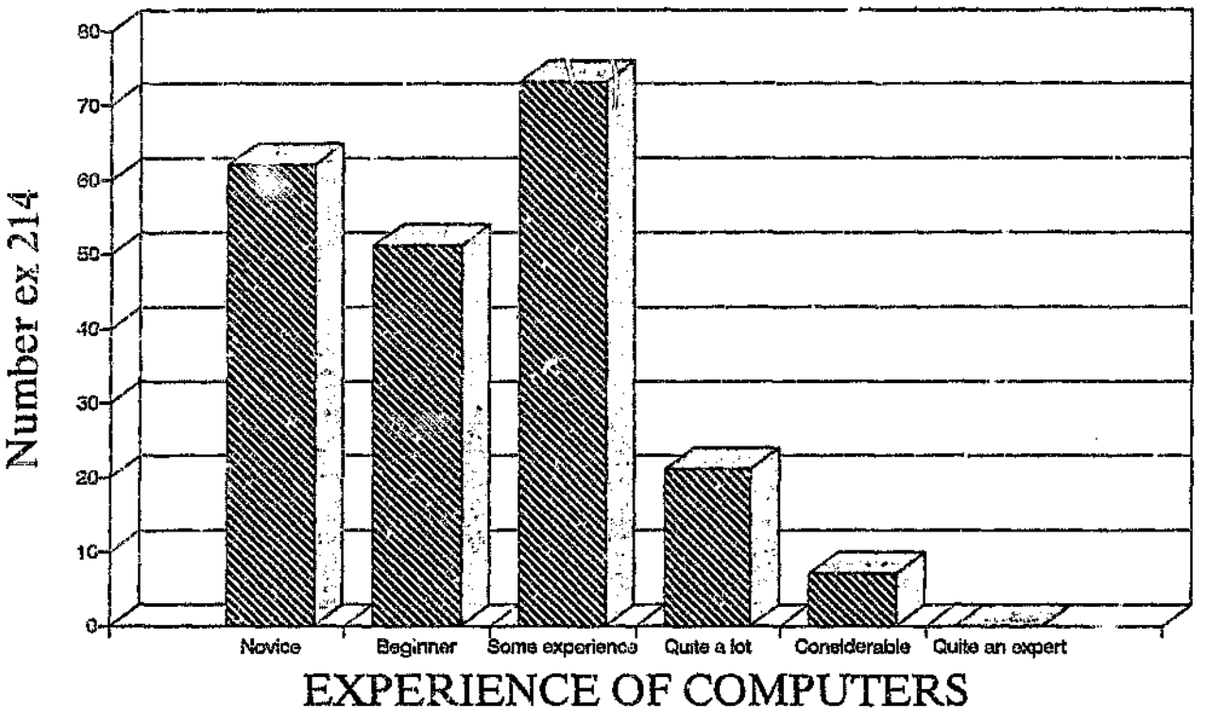
Because perceptions are linked to knowledge and experience, the second purpose of this study was to ascertain the knowledge and experience of the respondent teachers with regard to computers and their possible use in education. The following questions were included in the research instrument for this purpose: 22, 28, 30, 31 - 39 (esp. 35-38 here), 41, 42. (Questions 30 and 42 were introduced and graphed in 7.1., and Questions 39 and 41 proved to be rather bland, providing no really significant data.)

7.2.1. Analysis of Question 22 (see graph 16 on page 66), indicates that the vast majority of the respondents (86.9%) placed themselves in one of the first three categories, with 34.1% choosing "some experience". Only 9.8% (21 respondents) said they had had "quite a lot of experience"; and very few (3.3% - 7 respondents) said they had had "considerable experience". None at all placed themselves in the "quite an expert" category.

7.2.2. Question 28 (see graph 17 on page 66) asked respondents to rate their familiarity with thirteen applications and programming languages, in one of four categories. Only in Word-processing was there any number of respondents claiming proficiency, at 17.8%. Spreadsheets were next with 5.2%, and DOS third with 4.7%.

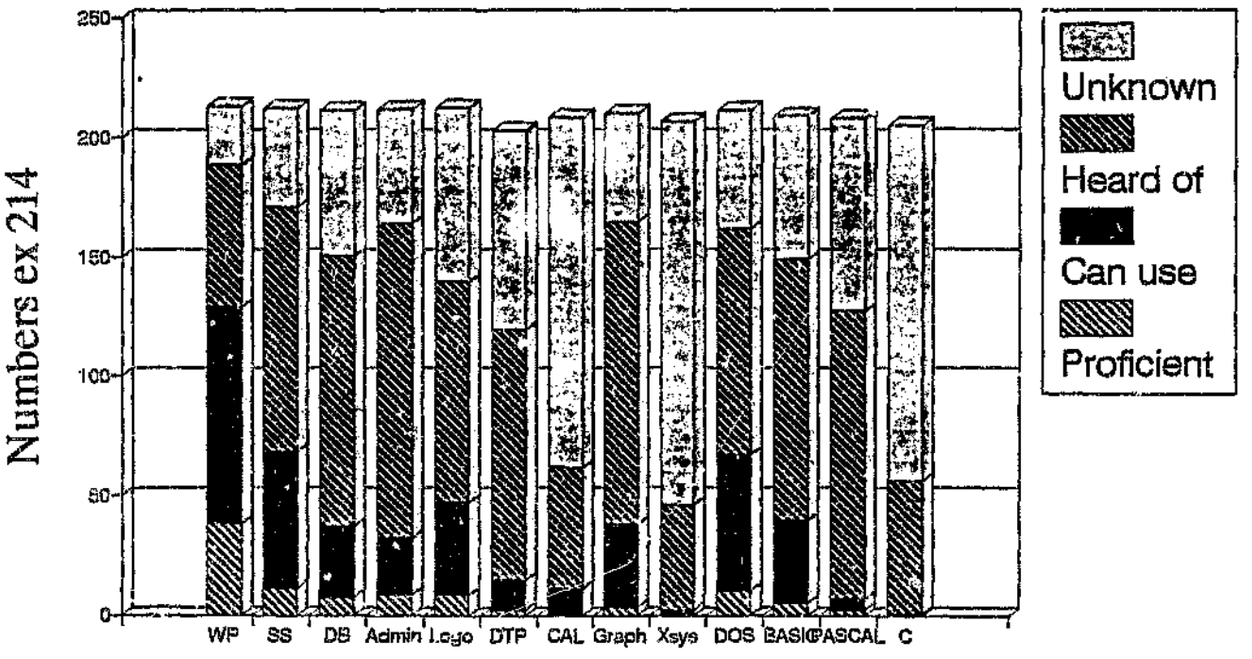
Combining the categories of "Proficient" and "Can use" resulted in a proportion of 60.3% of the respondents claiming to be either proficient in, or able to use, Word-processing. Spreadsheets followed with nearly half that number (31.8%), but with far fewer claiming proficiency. It was the same with DOS, third at 31.3%. Then came a grouping of 5 (Logo, BASIC, Graphics, Databases, and Administration) with between 22.1% and 15.1%. The remaining 5 had insignificant recognition.

GRAPH 16
(Question 22)



EXPERIENCE OF COMPUTERS

GRAPH 17
(Question 28)



FAMILIARITY WITH COMPUTER APPLICATIONS

Put another way, the breakdown in Question 33 is as follows: 129 of the 214 respondents (60.3%) claimed to be proficient in, or able to use, Wordprocessing; for Spreadsheets the number was 68 (31.8%); for DOS 67 (31.3%); for Logo (Turtle graphics) 47 (22.0%); for other Graphics programs 40 (18.7%); for Programming in BASIC also 40, in PASCAL 7, and in C 1 (48 = 22.4%); for Databases 37 (17.3%); for School Administration Packages 32 (15.0%); for CAL programs 11 (5.1%).

("School Admin Package" in fact involves the use of a "Database". The same applies to the item "Updating Records" in Question 36. No respondents commented on this apparent duplication.)

It is noteworthy that only three items were largely unknown - Expert Systems, C, and CAL. The first two are specialist items, but it was somewhat surprising that CAL (Computer Assisted Learning) was unknown to so many teachers. (It was even mentioned in the instrument, in the explanation between Questions 1 and 2.)

It is also worth noting that Desk Top Publishing (unknown to 41.2% of the respondents, heard of by 51.5%, used by 7.0%) and Expert Systems (unknown to 77.8%, heard of by 21.3%, used by 0.9%), both largely overlooked here, are regarded as having considerable potential in education -

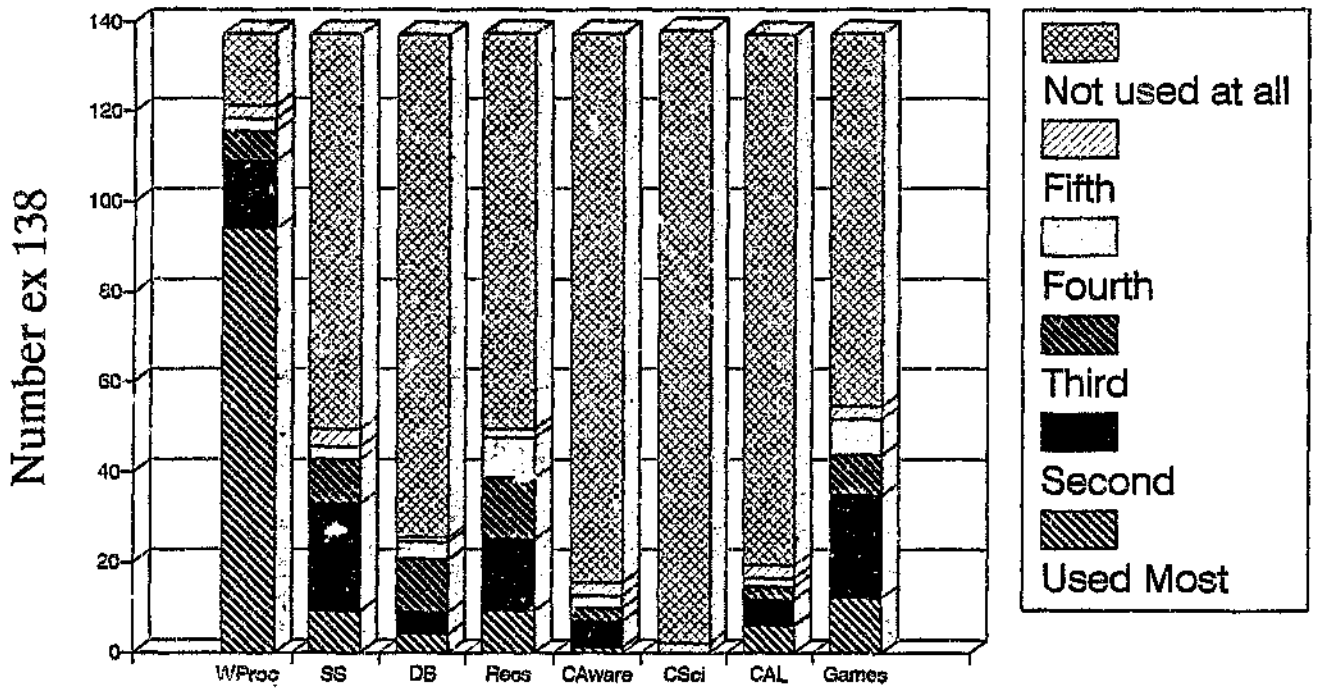
the former as an important development of word-processing, and the latter in CAL.

7.2.3. In Question 36 (see graph 18 on page 69), respondents were asked to rank in order up to eight uses (five of which occurred also in Question 28) in response to the question "What do you use a computer for most?", which was rephrased as "I switch on a PC most often for ...." No respondent in fact ranked more than six.

In coding the responses, any uses not ranked by the respondent were placed in the category "Not used at all". Graph 18 shows how important such a category was. Of the eight uses provided, Word-processing was the only one to be used by a majority of the respondents; only a small proportion used any of the other seven.

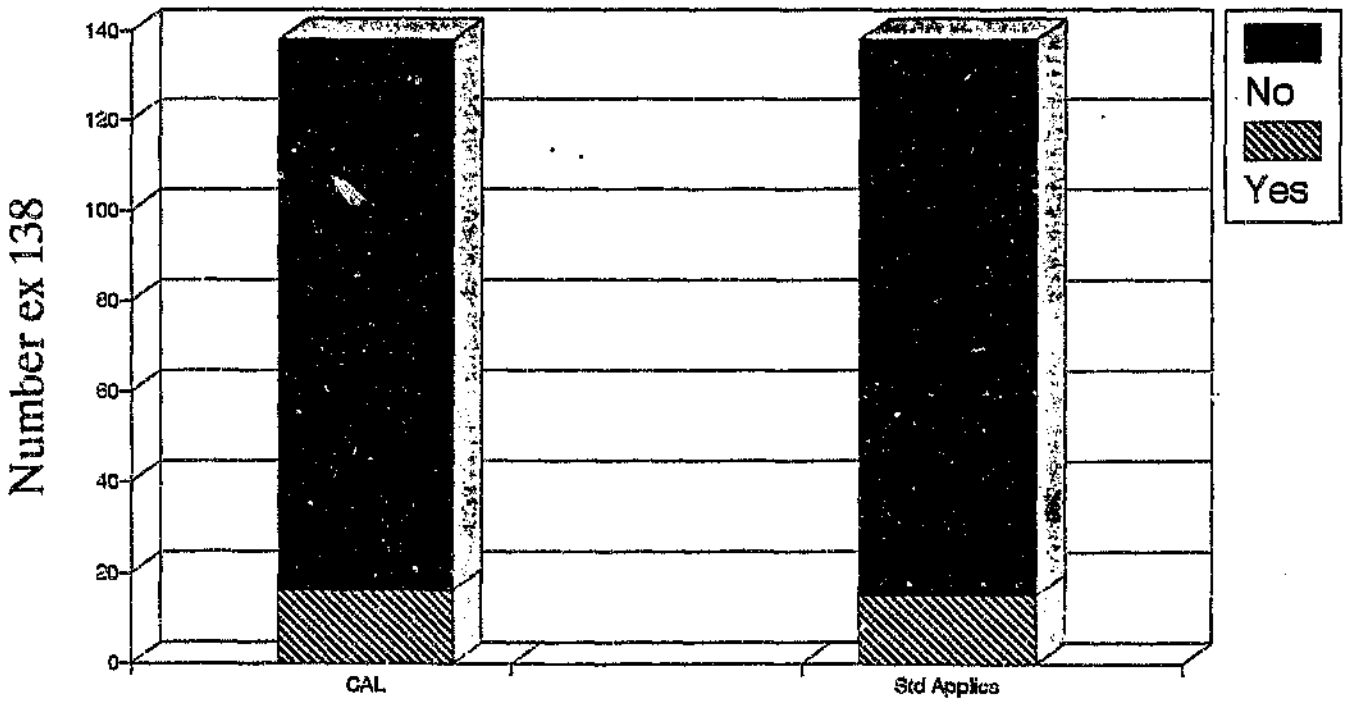
Word-processing was ranked first by 58.1% of the 138 respondents, and was ranked as being used at all by 88.4%. Games/entertainment (mentioned here for the first time in the instrument) was ranked first by only 8.7% of the respondents (a long way behind) but as being used at all by 39.9%. Spreadsheets and Updating Records were next at 6.5% each for first place, and used by 36.2% overall.

GRAPH 18
(Question 36)



RANKING OF ACTUAL USE IN 8 CATEGORIES

GRAPH 19
(Questions 37 and 38)



USE OF CAL AND STD APPLICS IN TEACHING

"Using a Database", CAL, and "Teaching Computer Awareness" had very little support; "Teaching Computer Science" was mentioned by only two respondents, who ranked it fifth and sixth respectively.

On the basis of the responses to Questions 28 and 36, it is clear that Word-processing, Spreadsheets, and Updating Records (= Databases; see paragraph in brackets above under Question 28) were the three uses best known to, and most used by, teachers. The Disk Operating System (DOS), and Games were the only other two used to any extent.

[Respondents who never used a computer were asked to omit Questions 31 to 40. 76 of the 214 respondents (35.5%) left them out. It could be assumed therefore that the 138 respondents (64.5%) who did answer these ten questions claimed to be using a computer. However, this figure does not tally with the response to Question 30, where only 109 of the 214 respondents (50.9%) said that they still used a computer. This is indicative of the kind of confusion mentioned towards the end of 7.1 above.]

7.2.4. **Questions 37 and 38 (see graph 19 on page 69)** were included in the instrument to establish how many respondents were actually using computers in their subject teaching, and at how many schools. 16 of the 138 respondents (11.6%) were using CAL programs (in the form

of Sergo, Plato, a biology program, and wordgames) - 7 from school C, 7 from school E, and 1 each from F and G. (The figure 16 is not consistent with Question 35, where 30 respondents claimed to be involved in the use of CAL; nor with Question 36, where 20 respondents ranked CAL as something they used a computer for.)

Of the 138, 15 (10.9%) were using applications packages in their teaching - 4 from school C, 1 from D, 8 from E, and 1 each from F and G. (There were 9 respondents (6.5%) using both CAL and applications programs - 3 from school C, and 6 from E.)

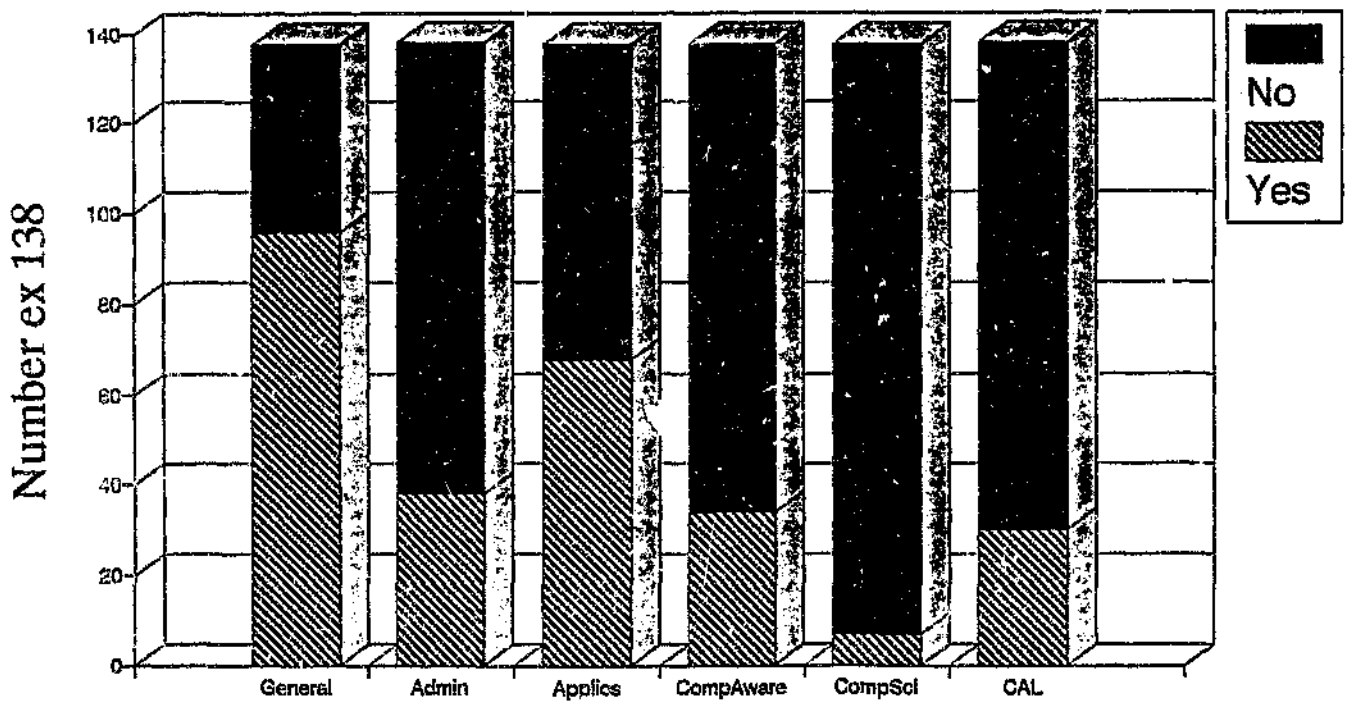
7.2.5. **Question 35 (see graph 20 on page 72)** referred to the six categories of computer use in education identified at the beginning of the instrument. Respondents were asked to indicate in which of the six categories they were in any way involved. (The proportions are expressed as percentages of the 138 respondents involved; but since many respondents were involved in more than one category, the total far exceeds 100.)

The categories "General" (69.6%) and "Use of Standard Applications" (49.3%) had most involvement. They were followed by "School Administration" (27.5%), "Computer Awareness" (24.6%), and "CAL" (21.7%). "Computer Science"

involved only 5.1% of the 138 respondents. These proportions generally agree (with two exceptions) with the more specific ranking presented in graph 18 (Question 36 - Actual Computer Use), and with the overall picture which emerged from the responses to the other questions considered in this section.

The two exceptions are CAL and Computer Awareness. In Question 35, more respondents (30) claimed involvement in CAL than actually ranked it (20) in Question 36, or mentioned programs (16) in Question 37. The same pattern applied to Computer Awareness - in Question 35 a total of 34 claimed involvement, but only 16 ranked it at all in Question 36, and only 15 said in Question 38 that they used the standard applications packages in their teaching.

GRAPH 20
(Question 35)



INVOLVEMENT IN 6 AREAS OF COMPUTER USE

7.2.6. Finally, whereas the respondents' perceived use of computers at their schools was conveyed in Question 42, their actual experience and use of the machines was described in their responses to Questions 28, 35, 36, 37, and 38.

The responses to uses in these six questions are tabled below as percentages for the purpose of comparison; the number of respondents in Question 42 was 214, and in Questions 35 to 38 was 138. It was taken as 138 in Question 28 too for the purposes of this table, since all the respondents who claimed familiarity with the uses provided in this question can be assumed to be users.

The following categories were tabled: Question 42 (Use of Computers at Schools) - "Yes" category only; Question 28 (Rating of Familiarity with Applications) - "Proficient" and "Can use" categories combined; Question 35 (Involvement in the Use of Computers); Question 36 (Ranking of Most Frequent Personal Use) - Totals only; Question 37 (Use of CAL in Teaching); Question 38 (Use of Applications in Teaching).

TABLE OF PERCEIVED SCHOOL AND ACTUAL RESPONDENT USES.

(Ranked by % in "Yes" category in Question 42.)

QUESTION NUMBERS	42	28	35	36	37	38
USES: PERCEIVED (% ex 214)		ACTUAL (% ex 138)				
Administration	98	23	28	36		
Word-processing	72	93		88		
Sending out Accounts	66					
Spreadsheets	57	49		3		
Computer Awareness	57		25	12		
Computer Science	36		5	1		
Applications in Subjects	29					11
Computer Club	29					
Computer Assted Learning	21	8	22	14	12	
Programming	15	35				
School Newspaper	15					
Stock Control	14					
Logo	11	35				
DOS		49				
Databases		27		19		
Graphics						
Gen. Use of Applications						
Games				40		

(Note: DOS, Databases, Graphics, the General Use of Applications/Use as Management Tools, and Games, were not mentioned separately in Question 42.)

The following conclusions may reasonably be drawn from this table:

a) About a quarter of all the respondents seemed to be involved in the use of the Administration Packages, which means essentially the use of Databases;
b) Word-processing was the utility application most widely used by teachers, being used nearly twice as much (by 60% of all respondents) as Spreadsheets (by 32% of all respondents);
c) Accounts seemed to be handled entirely by secretarial staff;
d) More respondents knew about spreadsheets than the 68 out of 214 (32%) who actually used them;
e) Much more attention was being paid to Computer Awareness than to Computer Science;
f) Utility Applications and CAL programs were used in lessons by only 7% of the respondents, and really only at two schools (C and E - Questions 37 and 38);
g) None of the respondents familiar with a programming language (mostly BASIC - Question 28) seemed to use it in their work as teachers;
h) Teaching staff do not use computers in the production of the school newspaper, or to control stock, or in a Computer Club, although there is the perception in some schools at least that computers are used for these purposes;

i) More teachers are familiar with Logo than use it at school.

To sum up, in the second half of 1991, at the seven schools who participated in the study, the areas of computer use in which teachers had most experience and knowledge were Word Processing (about 2/3), Spreadsheets (1/3), and Databases (1/4). These applications were used as Management Tools, but the teachers' knowledge of them seemed somewhat confused on occasion.

7.3 The third purpose.

This was to obtain relevant demographic and biographic information about the respondents and their schools. Questions 43 to 60 were included in the research instrument for this purpose, and the responses to questions 31 - 34 are also discussed here.

The data supplied by the responses to all these questions made no significant comment or impact on the data already discussed, but some points are worth making on Questions 31 to 34, one of which refers also to Question 57.

The responses to Questions 31 and 32 (see graphs 21 and 22 on page 79) show that 104 of the 214 respondents (48.6%)

had used a computer for more than a year, and a further 34 for less than a year, meaning that 64.5% of the respondents were using computers. 55 of these users (25.7% of the 214) used a computer only once a month or even more seldom. However, 83 of the users (38.8% of the 214) used a computer more frequently than once a week, with 24 (11.2%) using computers on an almost daily basis, 28 (13.1%) using them two or three times a week, and 31 (14.5%) using them once a week.

These are significant percentages, which suggest not only that there is a considerable number of teachers who already find computers valuable, but also that there is a sizeable core of regular users who could assist in various ways if it was decided to start inservice training of some sort in the use of computers in education.

Question 33 (see graph 23 on page 80) shows that, whatever the reason may be, respondents who use computers have twice as much access to one at home as at school (57.3% to 26.1%). This finding was supported by the analysis of Question 57, regarding the venue of the respondents' children's use of computers - 45.6% of respondents' children who use computers do so at home. More of their children thus use computers at home than at school (32.5%), or at tertiary education institutions (14.9%).

had used a computer for more than a year, and a further 34 for less than a year, meaning that 64.5% of the respondents were using computers. 55 of these users (25.7% of the 214) used a computer only once a month or even more seldom. However, 33 of the users (38. the 214) used a computer more frequently than once a week, with 24 (11.2%) using computers on an almost daily basis, 28 (13.1%) using them two or three times a week, and 31 (14.5%) using them once a week.

These are significant percentages, which suggest not only that there is a considerable number of teachers who already find computers valuable, but also that there is a sizeable core of regular users who could assist in various ways if it was decided to start inservice training of some sort in the use of computers in education.

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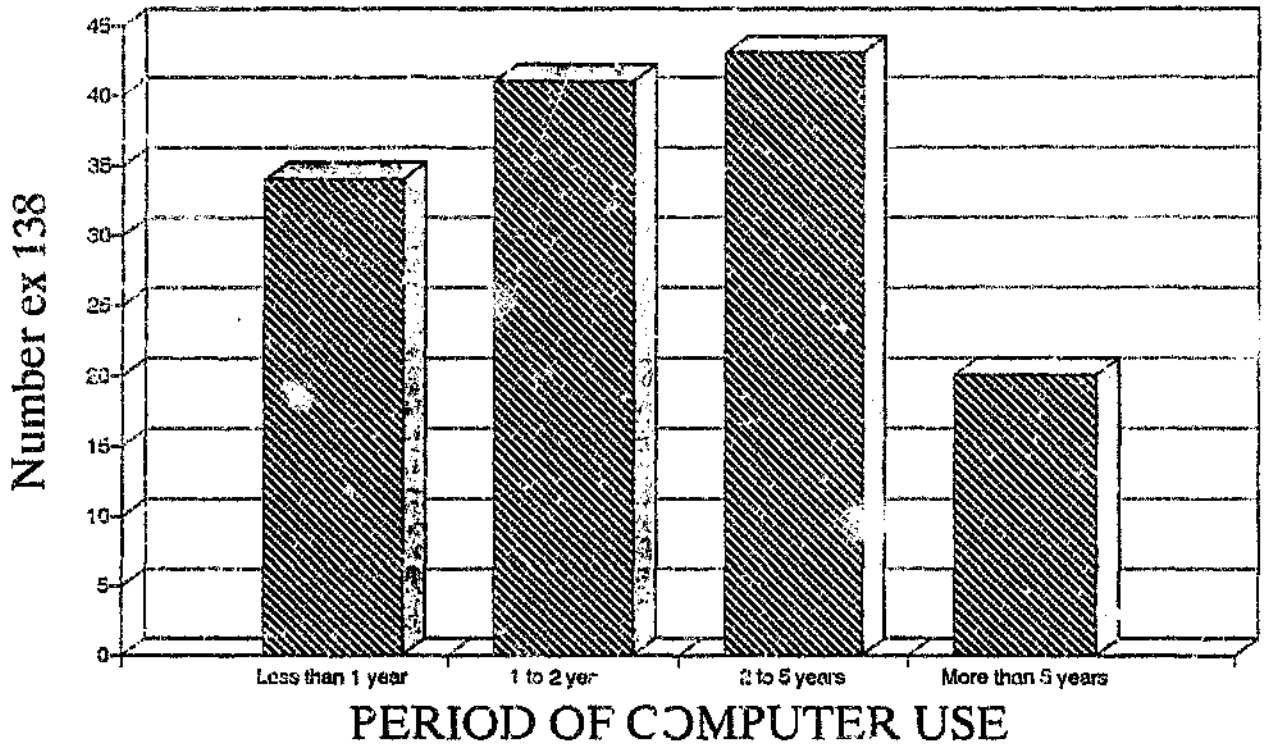
It appears from this that most computer users in the respondent group have computers at home, and use them more at home than at school. If this is an important factor in teachers' use of computers, it has serious implications not only for the use of the machines by teachers in their work, but also for their wider use in education at large.

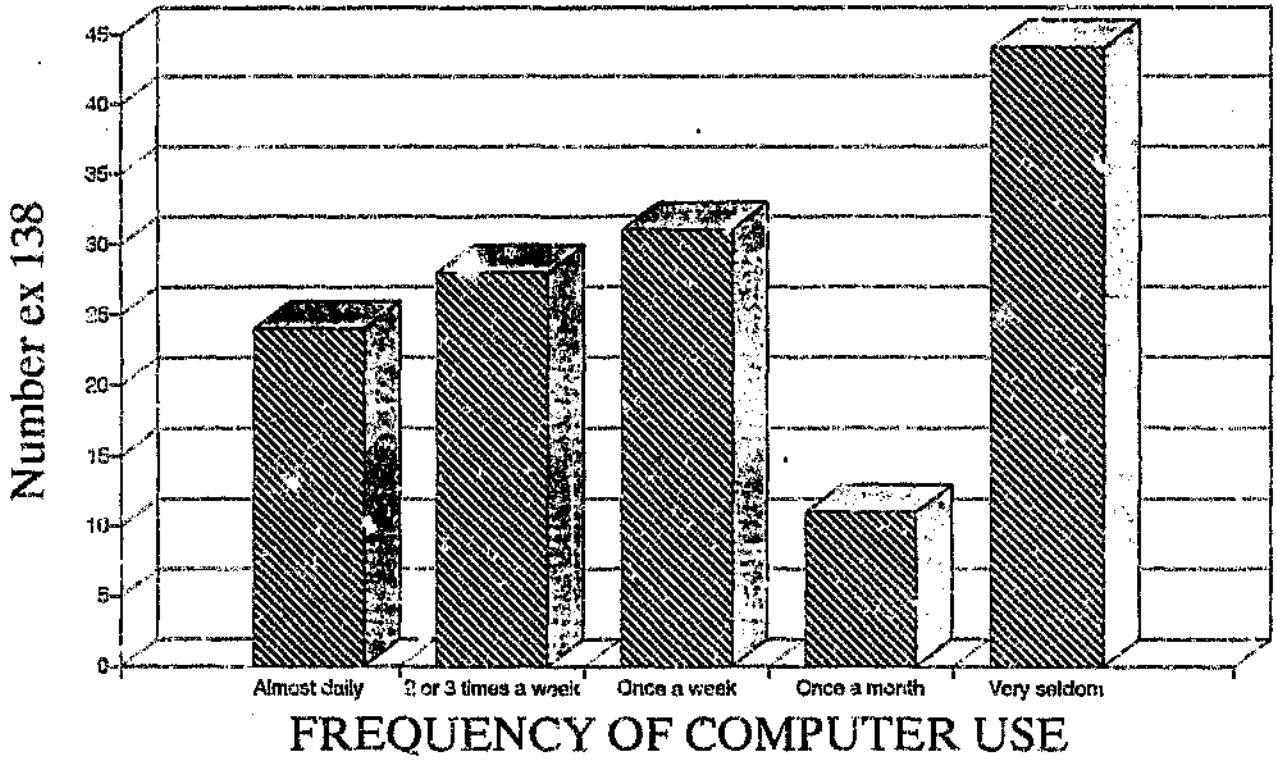
(At the time of writing, lap-top (portable) computers are arriving on the market in increasing numbers and at decreasing prices. The implications of this for bridging the home/school disparity have not been considered.)

The last point to be made has to do with Question 34 (see graph 24 on page 80), on respondents' training in computers. 44.9% were entirely self-taught, and a further 26.8% selected the category "Self plus other". This means that a total of 71.7% had a hand in their own training. This situation is probably in the process of changing, now that preservice training in computers is a requirement of the National Criteria for Teachers.

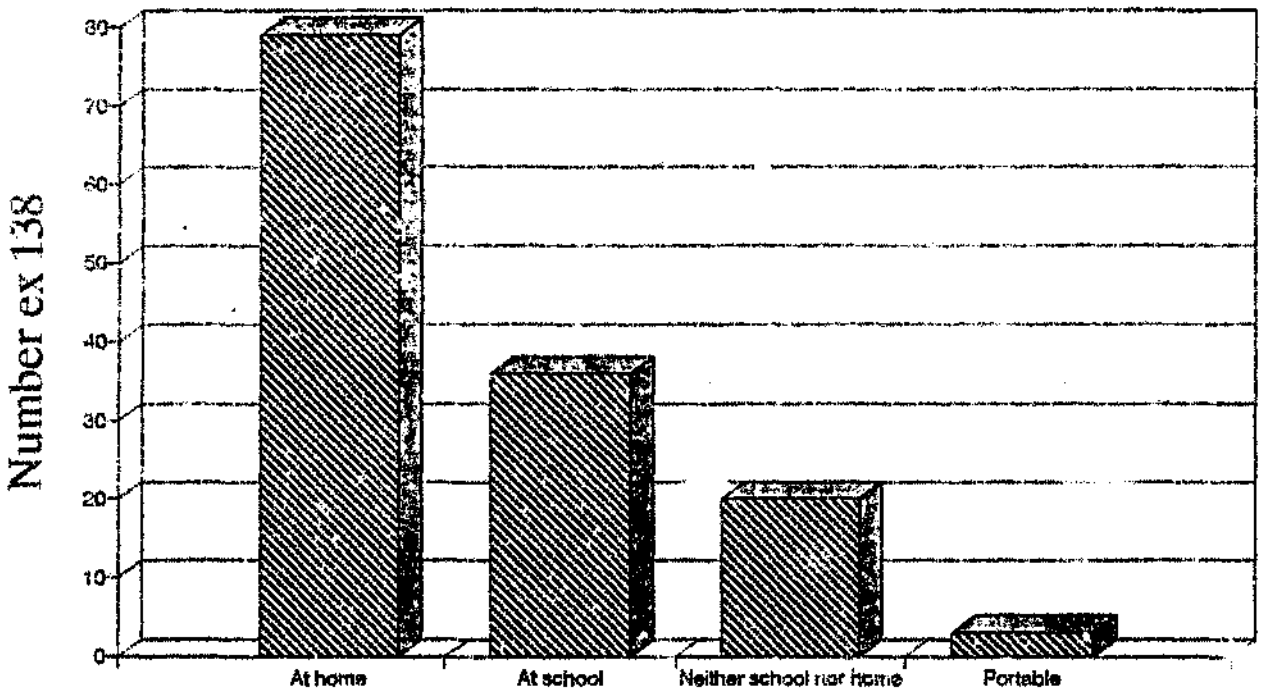
Graph 21
(Question 31)



GRAPH 22
(Question 32)

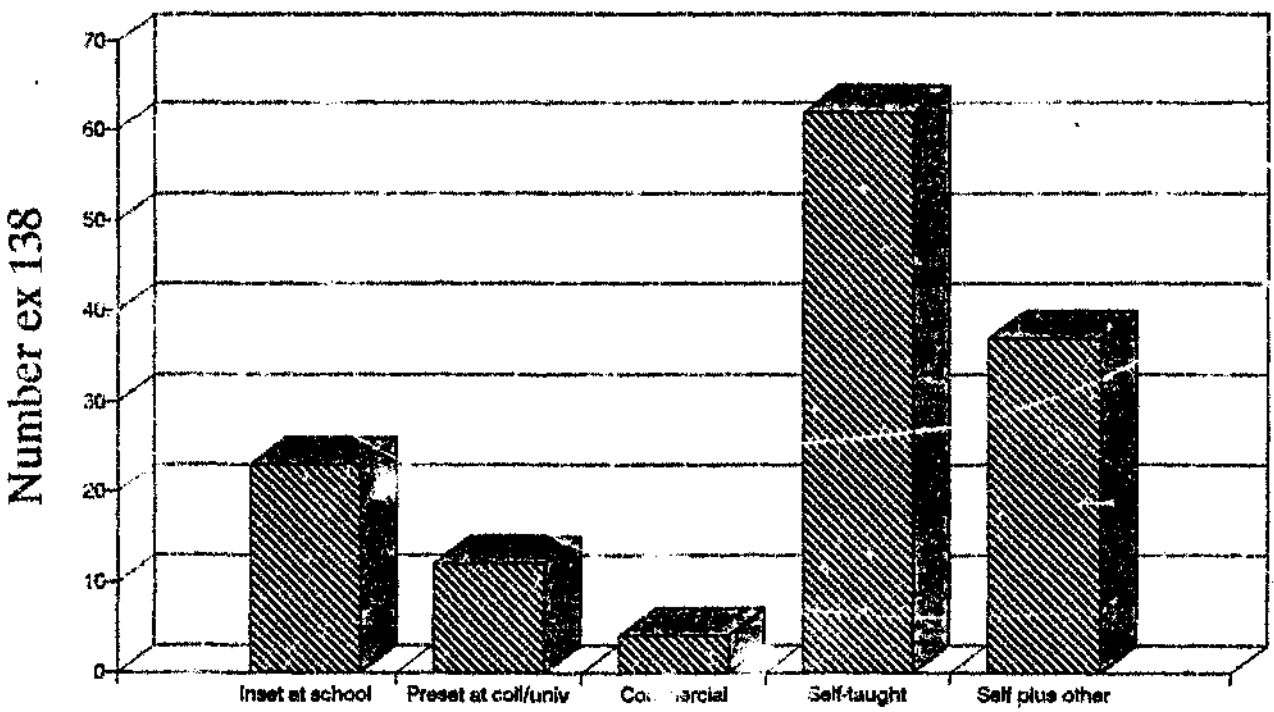


GRAPH 23
(Question 33)



PLACE OF GREATEST ACCESS TO A COMPUTER

GRAPH 24
(Question 34)



COMPUTER TRAINING

7.4 Some concluding remarks.

Rich (1991) was quoted earlier in this report as follows: "The emphasis (in computers in education) is turning to learning about typical computer applications in a variety of fields." Before teachers can help their pupils in this respect, they have to be able to apply computers in their own educational fields. The immediately useful and easily accessible applications here are word-processing, spreadsheets, and databases. These already have a significant user-base among the respondents in this survey, which would make the broadening of the base easier to accomplish.

After two rather obvious initial recommendations based on the implications of this report, the most significant findings in this section are extracted from their contexts.

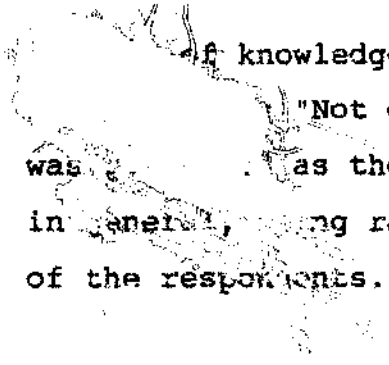
1. If schools regard computers and their possible uses in education as important, the place to start with them appears to be the staffroom rather than a computer room or the class room. To make computers and their possible advantages more accessible to teachers, they should be introduced into the staffroom first, in whatever numbers a school can afford or finds suitable, with appropriate security and at least one printer, and equipped with at

least the standard applications of wordprocessor, spreadsheet, and database programs. (A typing tutorial program would also be very useful.) Then the advantages of the use of computers as management tools could become apparent, especially via word-processing; those who can't will learn from those who can, without pressure or alarm.

2. Although in favour of their use, teachers seem generally not yet ready either to teach about computers, or to use them in their classrooms with their pupils. Until teachers are comfortable with at least the standard applications in a way that works for them, the presence of pupils would be counter-productive. This means that quite apart from the software problem, the notion of Computer Assisted Learning is some way from being accepted and implemented by most teachers, as are any of the more sophisticated uses.

3. The respondents were positive about the general concept of computers and their uses in education. None were negative, although some had reservations or were non-committal. However, these perceptions were based on varying levels of experience of computer use (50% used one, 25% had never used one, and the other 25% had not continued with their use). A very large percentage (94.9%) were interested in learning more about how to use one.

4. The responses to the Likert-type statements were consistent, and the perceptions posited in these statements can reasonably be assumed to reflect accurately those of the great majority of the respondents. The statements and their responses can thus be regarded as useful indicators of the perceptions held by this sample of teachers.



f knowledge about computers (phrased in the "Not enough people know what's going on") was as the greatest disadvantage of computer use in general, ng ranked either first or second by 77.6% of the respondents.

6. Although there was considerable support for the idea of computers as a medium of instruction, only 7.5% of the respondents actually used CAL programs, and this at only two of the seven schools. However, it is significant to note how "pupil-oriented" the respondents' rankings were in terms of the possible advantages. There was also an important level of concern with the source and nature, and thus by implication the content and presentation, of CAL programs.

7. Although word-processing was the most-used application, the respondents appeared not yet fully aware of just how

valuable it could be to them administratively in terms of the management, updating, and proof-reading of documents such as schemes of work, proforma documents, subject policies, notes, worksheets, tests, exams, and so on.

8. There was far greater support for the use of the computer as a management tool than as a medium of instruction.

9. Administration (with a 98.1% "Yes" response) was an almost universally-recognised use for computers at the schools. This was followed by Word-processing (72.4% "Yes"), and the sending out of Accounts (66.4%). Spreadsheets and Computer Awareness shared fourth place at 56.5%. These were the only five of the thirteen suggested uses to be acknowledged positively by the majority of the teachers in the sample.

10. There was a remarkable diversity of knowledge and awareness, both within the individual schools and among them, as to just how their computers were used. There was also some inconsistency.

11. Word-processing, Spreadsheets, and Updating Records (Databases) were the three uses best known to, and most used by, the respondents. The Disk Operating System (DOS),

and Games were the only other two used to any extent.

12. Much more attention seemed to be paid by schools to Computer Awareness than to Computer Science; but more respondents claimed an involvement in the Awareness area (16.4%) than actually used the applications in their lessons (7.0%).

13. None of the respondents familiar with a programming language (mostly BASIC) seemed to use it in their work as teachers, and although there were teachers familiar with Logo it appeared not to be used at school by any of them. (Logo is used predominantly at primary schools.)

14. About a quarter of all respondents seemed to be involved somehow in the use of the School Administration Packages, which implies essentially the use of Databases; Word processing was the utility application most widely used by teachers, being used nearly twice as much (60% of all respondents) as Spreadsheets (32% of all respondents); Accounts seemed to be handled entirely by secretarial staff and more respondents knew about spreadsheets than the 32% who actually used them.

15. There was a significant number of teachers who already found computers valuable and who used the machines regularly. They could help in various ways if it was

decided to start inservice training of some sort in the use of computers in education.

16. Respondents who used computers claimed twice as much access to a computer at home as at school (57.3% to 26.1%). It appeared from this that most computer users in the respondent group had computers at home, and used them more there than at school.

17. To conclude: in the second half of 1991, at the seven schools who participated in the study, Word-processing, Spreadsheets, and Databases, in that order, and used as Management Tools, seemed to be the areas of use in which teachers had most experience and knowledge. The respondents were positive about the general concept of computers and their uses in education, and a very large percentage (94.9%) were interested in learning more about the use of computers. If computers are to be more widely used in education, it is this base that should be developed.

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APPENDIX A

ANALYSES OF THE FREQUENCY DISTRIBUTIONS/MEANS/RANKINGS OF THE DATA PROVIDED BY EACH QUESTION IN THE INSTRUMENT.

The Frequency Distribution of the responses in each code category is provided, by number and percentage, together with the Mean, if valid. (The database coding for each question is generally indicated underneath the question, on the extreme left-hand side of the page. The code for Question 1, for example, is "01w"; the responses to it were coded/categorised 0/1/2/3)

Question 1. What is the first word or phrase that comes to
01w mind when you hear the word "computer"?

	n = 214 Mean: 1.59	FD	%
0	No response	23	10.7
1	Positive words	70	32.7
2	Neutral words	92	43.0
3	Negative words	29	13.6

THE REST OF THE RESPONSES WERE GROUPED INTO EIGHT TABLES.

TABLE 1 - QUESTIONS 2 to 22

RESPONSES TO 19 LIKERT-TYPE STATEMENTS (QUESTIONS 2 - 20), ALL CODED ON THE FOLLOWING 5-POINT SCALE:

SA: 1	A: 2	U: 3	D: 4	SD: 5

TOGETHER WITH QUESTION 21 (PERCEPTION OF COMPUTERS IN GENERAL) AND QUESTION 22 (EXPERIENCE OF COMPUTERS).

Question 2. Learning how to use a computer is too much
02 trouble at this stage of my life.

FD	SA = 5	A = 14	U = 12	D = 86	SD = 97
%	2.3	6.5	5.6	40.2	45.3

Mean: 4.20

Question 3. High-school pupils should be proficient in the
03 use of computers for the standard applications packages (wordprocs, spreadsheets, databases).

FD	SA = 80	A = 110	U = 19	D = 3	SD = 2
%	37.4	51.4	8.9	1.4	0.9

Mean: 1.77

Question 4. There is no scope for computers as a medium of
04 instruction in my subject.

FD	SA = 3	A = 13	U = 20	D = 76	SD = 102
%	1.4	6.1	9.3	35.5	47.7

Mean: 4.22

Question 5. Computers should be of use to teachers, just
05 as they are to other professionals like accountants, doctors, and lawyers.

FD	SA = 106	A = 104	U = 2	D = 2	SD = 0
%	49.5	48.6	0.9	0.9	0.0

Mean: 1.53

Question 6. If I use computers as a medium of instruction
06 I will no longer be in control of the teaching/learning situation in my classes.

FD	SA = 1	A = 5	U = 17	D = 98	SD = 93
%	0.5	2.3	7.9	45.8	43.5

Mean: 4.29

Question 7. The use of computers in education should be
07 restricted to the use of school administration packages.

FD	SA = 0	A = 4	U = 5	D = 89	SD = 116
%	0.0	1.9	2.3	41.6	54.2

Mean: 4.4

Question 8. Teachers should know how to use computers for
08 the standard applications packages (e.g. wordprocessors, spreadsheets, databases).

FD	SA = 85	A = 110	U = 14	D = 5	SD = 0
%	39.7	51.4	6.5	2.3	0.0

Mean: 1.71

Question 9. Teachers should understand the technology of
09 how a computer works.

FD	SA = 17	A = 68	U = 33	D = 83	SD = 13
%	7.9	31.8	15.4	38.8	6.1

Mean: 3.03

Question 10. Computers are too expensive to justify their purchase as teaching tools.

FD	SA = 3	A = 11	U = 27	D = 129	SD = 42
%	1.4	5.1	12.6	60.3	19.6

Mean: 3.89 No response: 2 (= 0.9%)

Question 11. Computers can improve the teaching/learning situation.

FD	SA = 45	A = 145	U = 19	D = 4	SD = 0
%	21.1	68.1	8.9	1.9	0.0

Mean: 1.91 No response: 1 (= 0.5%)

Question 12. I don't see how computers can help me do a better job.

FD	SA = 0	A = 5	U = 24	D = 110	SD = 75
%	0.0	2.3	11.2	51.4	35.1

Mean: 4.19

Question 13. There are good computer programs available in South Africa which would be useful in teaching my subject.

FD	SA = 19	A = 57	U = 112	D = 18	SD = 8
%	8.9	26.6	52.3	8.4	3.7

Mean: 2.71

Question 14. Computers are a threat to my self-esteem.

FD	A = 2	A = 3	U = 6	D = 88	SD = 114
%	0.9	1.4	2.8	41.3	53.5

Mean: 4.43 No response: 1 (= 0.5%)

Question 15. Teachers and their pupils should be as
15 comfortable with computers as they are with reading, writing, and arithmetic.

FD	SA = 65	A = 122	U = 16	D = 10	SD = 1
%	30.4	57.0	7.5	4.7	0.5

Mean: 1.88

Question 16. Computers are a teaching tool, like an
16 Overhead Projector or a Video Recorder.

FD	SA = 57	A = 138	U = 13	D = 5	SD = 0
%	26.8	64.8	6.1	2.3	0.0

Mean: 1.83 No response: 1 (= 0.5%)

Question 17. Using computers as a medium of instruction
17 will lower academic standards.

FD	SA = 0	A = 9	U = 19	D = 113	SD = 73
%	0.0	4.2	8.9	52.3	34.1

Mean: 4.17

Question 18. Computers as a medium of instruction have great potential.

18

FD	SA = 74	A = 121	U = 17	D = 2	SD = 0
%	34.6	56.5	7.9	0.9	0.0

Mean: 1.75

Question 19. Computers will be the text-books of the future.

19

FD	SA = 18	A = 56	U = 76	D = 55	SD = 9
%	8.4	26.2	35.5	25.7	4.2

Mean: 2.91

Question 20. Computers have more advantages than disadvantages for education.

20

FD	SA = 49	A = 128	U = 28	D = 7	SD = 1
%	23.0	60.1	13.1	3.3	0.5

Mean: 1.97 No response: 1 (= 0.5%)

Question 21. Respondent's PERCEPTION of Computers in General. (Into which one of the following four categories would you place yourself?)

21p

	n = 214	FD	%
1	positive	169	79.0
2	negative	0	0.0
3	unsure and hesitant	37	17.3
4	ignorant and scared	8	3.7

Question 22. Respondent's EXPERIENCE of Computers. (Into 22e which one of the following six categories would you place yourself?)

	n = 214 Mean: 2.35	FD	%
1	a complete novice	62	29.0
2	a beginner	51	23.8
3	had some experience	73	34.1
4	had quite a lot of experience	21	9.8
5	had considerable experience	7	3.3
6	quite an expert.	0	0.0

TABLE 2: QUESTIONS 23 to 27.

RANKINGS OF VARIOUS ASPECTS OF COMPUTERS IN GENERAL, AND IN EDUCATION IN PARTICULAR.

Question 23. Ranking A: General Advantages of Computers.

(1 = greatest advantage; 5 = least.)

	General advantages of computers:	Mean	Rank
23a	Speed & accuracy of data access/calculations	2.64	1
23d	Storage of documents with ease of alteration	2.69	2
23r	Reduction of routine administrative burdens	2.69	2
23q	Can store and access huge quantities of data	2.71	4
23s	Simulation of problems for possible solution	4.01	5

(Of the 214 responses, there were the following numbers of no responses in code categories 23a to 23s: 23a - 3, 23d - 4, 23r - 3, 23q - 2, 23s - 3)

Question 24. Ranking B: General Disadvantages.

(1 = greatest disadvantage; 5 = least.)

	General disadvantages of computers:	Mean	Rank
24i	Not enough people know what's going on	1.78	1
24c	Computers cost too much	2.04	2
24s	There is inadequate data security/privacy	3.19	3
24d	Computers are dehumanising	3.82	4
24u	Computers are unreliable	3.98	5

(Of the 214 responses, there were the following numbers of no responses in code categories 24i to 24u: 24i - 3, 24c - 2, 24s - 3, 24d - 3, 24u - 2)

Question 25. Ranking C: Advantages of Computers as Medium of Instruction.

(1 = greatest advantage; 5 = least.)

	Advantages as medium of instruction:	Mean	Rank
25o	Pupils work on their own, at their own pace	1.79	1
25a	The pupil has to be actively involved	2.16	2
25p	Computers have endless patience	3.40	3
25n	Computers do not make personal judgements	3.69	4
25i	Computers offer individual record-keeping	3.86	5

(Of the 214 responses, there were the following numbers of no responses in code categories 25o to 25i: 25o - 1, 25a - 1, 25p - 1, 25n - 1, 25i - 2)

Question 26. Ranking D: Disadvantages as Medium of Instruction.

(1 = greatest disadvantage; 5 = least.)

	Disadvantages as medium of instruction:	Mean	Rank
26q	Pupils cannot ask questions in their own way	2.40	1
26e	Pupils do not explore ideas with their peers	2.76	2
26m	There is no human mediation	2.88	3
26s	Programs cannot be changed to suit classes	3.37	4
26p	Who decides what is in the program?	3.43	5

(Of the 214 responses, there were the following numbers of no responses in code categories 26q to 26p: 26q - 1, 26e - 2, 26m - 3, 26s - 2, 26p - 3)

Question 27. Ranking E: Administrative Uses of Computers at Respondent's School. (1 = most valuable or important to respondent; 5 = least.)

	Administrative uses in education:	Mean	Rank
27r	Processing marks and printing reports	1.56	1
27m	Producing marksheets with averages, etc	2.49	2
27p	Processing promotion schedules etc	3.16	3
27w	Word-processing (notes, tests, exams etc)	3.44	4
27t	Keeping track of pupil and staff records	4.04	5

(Of the 214 responses, there were the following numbers of no responses in code categories 27r to 27t: 27r - 4, 27m - 4, 27p - 4, 27w - 3, 27t - 3)

TABLE 3: QUESTIONS 28 TO 30.

FAMILIARITY OF RESPONDENTS WITH COMPUTER APPLICATIONS; AND ATTITUDE, USE, AND INTEREST.

Question 28. Rating of Familiarity with Computer Applics.

	n = 214	1		2		3		4			
	Familiar with:	Profic.		Can Use		Heard Of		Unknown			
		FD	%	FD	%	FD	%	FD	%	Mean	Rank
28w	Wordproc	38	17.8	91	42.5	60	28.0	25	11.7	2.34	1
28s	Spreadshs	11	5.2	57	26.8	103	48.4	42	19.7	2.81	2
28o	DOS	10	4.7	57	26.9	95	44.8	50	23.6	2.85	3
28g	Graphics	3	1.4	35	16.6	127	60.2	46	21.8	2.98	4
28a	SchoolAdm	8	3.8	24	11.3	132	62.3	48	22.6	3.01	5
28b	BASIC	5	2.4	35	16.7	110	52.4	60	28.6	3.01	5
28d	Databases	7	3.3	30	14.2	114	53.8	61	28.8	3.05	7
28l	Logo/Turt	8	3.8	39	18.3	93	43.7	73	34.3	3.07	8
28t	DTP	2	1.0	13	6.4	105	51.5	84	41.2	3.17	9
28p	PASCAL	2	1.0	5	2.4	121	57.9	81	38.8	3.27	10
28m	CAL/CBE	0	0.0	11	5.3	51	24.4	147	70.3	3.57	11
28c	C	1	0.5	0	0.0	56	27.2	149	72.3	3.57	11
28x	ExpertSys	0	0.0	2	1.0	44	21.3	161	77.8	3.64	13

Note: There were varying numbers of no responses in all except the first of the items for rating in Question 28. The numbers of no responses ranged from 1 to 10, and only Wordprocessing (28w) was rated by all. The percentages were calculated accordingly.

Question 29. Respondent's Choice of Description Which Best
29a Categorises Attitude to Computers in Education.

	n = 214	FD	%
1	enthusiastic/very positive/impressed/interes	109	50.9
2	enthusiastic but critical about use	47	22.0
3	enthusiastic but worried about implications	33	15.4
4	unfavourable/negative/unhelpful	0	0.0
5	antagonistic/insecure/won't use computers	0	0.0
6	indifferent/noncommittal/comps won't be used	4	1.9
7	uninitiated/computers unknown entity	20	9.4
8	not-mentioned/no opinion at all about comps	1	0.5

Question 30. Use of and Interest in Computers.

	n = 214	Yes (= 1)		No (= 2)	
		FD	%	FD	%
30e	Have you ever used a PC?	162	76.0	51	24.0
30s	Do you still use one?	109	52.2	100	47.8
30i	Are you interested in learning more about how to use one?	203	95.8	9	4.2

(No responses from the 214: e - 1, s - 5, i - 2)

TABLE 4: QUESTIONS 31 TO 36.

DETAILS OF RESPONDENTS' USE OF, AND INVOLVEMENT IN, COMPUTERS IN EDUCATION.

Note: Teachers who never use a computer were asked to omit questions 31 to 40. There were 76 respondents in this category (35.5%) reducing N to 138 for these questions.

Question 31. Length of Use of a Computer.

311

	n = 138 Mean: 1.54	FD	%
1	Less than a year	34	24.6
2	One to two years	41	29.7
3	Two to five years	43	31.2
5	More than five years	20	14.5

Question 32. Frequency of Use of a Computer.

32f

	n = 138 Mean: 2.04	FD	%
1	Almost daily	24	17.4
2	Two or three times a week	28	20.3
3	Once a week	31	22.5
4	Once a month	11	8.0
5	Very seldom	44	31.9

Question 33. Place of Greatest Access to a Computer.

33a

	n = 138	FD	%
1	At home	79	57.3
2	In the staffroom	2	1.5
3	Elsewhere at school	34	24.6
4	Outside school but not at home	20	14.5
5	A portable	3	2.2

Question 34. Computer Training

34t

	n = 138	FD	%
1	Inservice training at school	23	16.7
2	Preservice training at col[illegible] unive	12	8.7
3	Commercial training course of some sort	4	2.9
4	None at all - self-taught	[illegible]	44.9
5	Self-taught plus one of the above	37	26.8

Question 35. Involvement in the Use of Computers in Education.

	n = 138	Num	Rank
35g	Interested in PC's in general and their relev	96	1
35p	The use of standard applications packages (eg wordprocessors/spreadsheets/databases etc.)	68	2
35a	The use of school administration packages	38	3
35f	Computer Awareness - the use of computers to familiarise pupils with standard applications packages and other commercially-available pro	34	4
35m	Computers as a medium of instruction - teachi school subjects with CAL or CBE programs	30	5
35s	Computer Science - the matric subject	7	6

Note: these figures indicate that many respondents claim to be involved in more than one area.

Question 36/1. Ranking of Actual Use of Computers in Terms of Frequency of Use - Means.

	I switch on a PC most often for:	Mean	Rank
36w	Using a wordprocessor	0.81	1
36g	Games/Entertainment	0.62	2
36r	Updating pupil and staff records etc	0.60	3
36s	Using a spreadsheet	0.56	4
36d	Using a database	0.34	5
36m	Teaching my subj with CAL programs	0.25	6
36f	Teaching Computer Awareness	0.23	7
36c	Teaching Computer Science	0.05	8

Question 36/2. Description of Actual Use of Computers in Terms of Frequency of Use - by Frequency Distribution and %

n = 138

Frequency of use for:		0		1		2		3		4		5		6	
		FD	%	FD	%	FD	%	FD	%	F	%	F	%	F	%
36w	WP	16	11.6	94	68.1	15	10.9	7	5.1	3	2.2	2	1.5	1	0.7
36g	Gam	83	60.1	12	8.7	23	16.7	9	6.5	8	5.8	2	1.5	1	0.7
36s	SS	88	63.8	9	6.5	24	17.4	10	7.3	3	2.2	3	2.1	1	0.7
36r	Rec	88	63.8	9	6.5	16	11.6	14	10.	9	6.5	2	1.5	0	0.0
36m	CAL	118	85.5	6	4.4	6	4.4	3	2.2	2	1.5	0	0.0	3	2.2
36d	DB	112	81.2	4	2.9	5	3.6	12	8.7	4	2.9	0	0.0	1	0.7
36f	CA	122	88.4	1	0.7	6	4.4	3	2.2	3	2.2	3	2.2	0	0.0
36c	CS	136	98.6	0	0.0	0	0.0	0	0.0	0	0.0	1	0.7	1	0.7

TABLE 5: QUESTIONS 37 TO 41.

RESPONDENTS' USE OF COMPUTERS IN THE CLASSROOM, AND KNOWLEDGE OF AND ATTITUDE TOWARDS THEM.

Question 37. Details of Computer-Assisted-Learning

37m Programs Used.

	n = 138	FD	%
0	No response	11	8.0
1	Do use CAL programs	16	11.6
2	Do not use CAL programs	111	80.4

Programs mentioned: Sergo, Plato, a biology program, and wordgames

Question 38. Use of Standard Applications Packages in

38a Subject Teaching.

	n = 138	FD	%
0	No response	1	0.7
1	Yes	15	10.9
2	No	122	88.4

Question 39. Knowledge of the Difference between Software

39d and Hardware.

	n = 138	FD	%
0	No response	13	9.4
1	Correct	65	47.1
2	Perhaps	32	23.2
3	Wrong	28	20.3

Question 40. Feelings of Respondents about Using Computers
40a and 40b a) as Management Tools
b) as a Medium of Instruction
in Their Work as Teachers.

	n = 138	Man. Tools FD	Man. Tools %	Med. of Instr FD	Med. of Instr %
0	No response	14	10.1	5	3.6
1	Positive	111	80.4	72	52.2
2	Neutral	7	5.1	36	26.1
3	Negative	6	4.4	25	18.1

Question 41. Knowledge Before Completing Questionnaire on Five Aspects of Computer Use:

	n = 214	Yes (= 1) FD	Yes (= 1) %	No (= 2) FD	No (= 2) %
41t	Readiness to type, even slowly	174	81.3	35	16.4
41p	Programming knowhow unnecess.	178	83.2	32	15.0
41k	No special knowledge required	161	75.2	48	22.4
41a	Many purpose-spec progs avail	182	85.1	27	12.6
41s	Movement/simulat/what-if poss	123	57.5	86	40.2

(No response from the 214: t= 5, p= 4, k= 5, a = 5, s = 5)

TABLE 6: QUESTIONS 42 TO 46.

SOME DEMOGRAPHIC DETAILS OF THE SEVEN SCHOOLS INVOLVED AND THEIR USE OF COMPUTERS.

Question 42. Respondents' Knowledge of the Use of Computers at their Schools - FD, %, Mean.

		1		2		3		0			
		Yes		No		Don't Kn		No resp			
	n = 214	FD	%	FD	%	FD	%	FD	%	Mean	Rank
42a	Admin	210	98.1	0	0.0	1	0.5	3	1.4	1.00	1
42w	Wordproc	155	72.4	22	10.3	31	14.5	6	2.8	1.36	2
42f	Comp Aware	121	56.5	48	22.4	34	15.9	11	5.1	1.49	3
42g	Accounts	142	66.4	9	4.2	57	26.6	6	2.8	1.55	4
42s	Spreadshts	121	56.5	15	70.1	68	31.8	10	4.7	1.66	5
42c	Comp Sci	77	36.0	87	40.7	38	17.8	12	5.6	1.71	6
42p	Std Applic in Sch Sub	61	28.5	68	31.8	71	33.2	14	6.5	1.92	7
42k	Comp Club	61	28.5	65	30.4	75	35.1	13	6.1	1.94	8
42m	CAL	46	21.5	88	41.1	67	31.3	13	6.1	1.98	9
42n	School New	32	15.0	93	43.5	76	35.5	13	6.1	2.08	10
42e	Comp Prog	33	15.4	64	29.9	104	48.6	13	6.1	2.21	11
42l	Logo	23	10.8	73	34.1	104	48.6	14	6.5	2.25	12
42r	Stock Cont	30	14.0	55	25.7	117	54.7	12	5.6	2.29	13

(The data in question 42 is plotted school by school in Appendix D.)

Question 43. Numbers of Computers in Schools.

43n

	n = 214 Mean: 8.85	FD	%
0	No idea	44	20.6
1	One	8	3.7
2	Two to five	45	21.0
5	Five to ten	7	3.3
10	Ten to twenty	44	20.6
20	More than twenty	66	30.8

Question 44. Number of Respondents at Single-sex and Co-educational Schools.

44g

	n = 214	FD	%
0	No response	5	2.3
1	Single-sex	55	25.7
2	Co-educational	154	72.0

Question 45. Number of Respondents at Private and Public Schools.

45m

	n = 214	FD	%
0	No response	8	3.7
1	Private	19	8.9
2	Public	187	87.4

Question 46. Description of Socio-economic Background of 46s Most Pupils in School.

	n = 214 Mean: 1.74	FD	%
0	No response	4	1.9
1	Privileged	80	37.4
2	Advantaged	98	45.8
3	Average	32	15.0
4	Disadvantaged	0	0.0
5	Underprivileged	0	0.0

TABLE 7: QUESTIONS 47 TO 54.

SOME ASPECTS OF RESPONDENTS' TEACHING BACKGROUND.

Question 47. Number of Years in Teaching.

47t

	n = 214 Mean: 7.71	FD	%
0	No response	2	0.9
1	One year	22	10.3
2	Two to five years	52	24.3
5	Five to ten years	49	22.9
10	Ten to twenty years	50	23.4
20	More than twenty years	39	18.2

Question 48. Teaching Subjects, by Discipline.

48a and 48b

		First Subj.		Second Subj.	
	n = 214	FD	%	FD	%
0	Nil / no response	2	0.9	109	50.9
1	Humanities	35	16.4	13	6.1
2	Languages	74	34.6	28	13.1
3	Sciences	64	29.9	29	13.6
4	Commercial	11	5.1	5	2.3
5	Practical	8	3.7	0	0.0
6	Formative	20	9.4	30	14.0

Question 49. Standards Taught.

491

	n = 214	FD	%
0	No response	2	0.9
1	Junior secondary (Stds 6 and 7)	15	7.0
2	Senior secondary (Stds 8 to 10)	63	29.4
3	Both	134	62.6

Question 50/1. Teaching Qualifications - Academic.

50a

	n = 214	FD	%
0	Nil / no response	53	24.8
1	Bachelor's	104	48.6
2	Honours	48	22.4
3	Master's	8	3.7
4	Doctorate	1	0.5

Question 50/2. Teaching Qualifications - Professional.

50b

	n = 214	FD	%
0	Nil/no response	26	12.2
1	1-year diploma	117	54.7
4	4-year dipl/degr	71	33.2

Question 51. (51m) Major Subjects in Degree/Diploma.

Not coded - generally same as teaching subjects.

Question 52. (52g) Gender.

	n = 214	FD	%
0	No response	4	1.9
1	Female	150	70.1
2	Male	60	28.0

Question 53. (53a) Age of Respondents.

	n = 214 Mean: 3.07	FD	%
0	No response	2	0.9
1	Teens	0	0.0
2	Twenties	83	38.8
3	Thirties	44	20.6
4	Forties	69	32.2
5	Fifties	14	6.5
6	Sixties	2	0.9

Question 54. (54c) Parent-Respondents.

	n = 214	FD	%
0	No response	2	0.9
1	Have children	107	50.0
2	Do not have children	105	49.1

TABLE 8: QUESTIONS 55 TO 60.

RESPONDENTS' OWN CHILDREN AND THEIR USE OF COMPUTERS.

Question 55. Present Situation of Respondents' Children.

	n = 162	FD	%
55n	Nursery/Pre-primary Schools	25	15.4
55p	Primary Schools	42	25.9
55h	High Schools	44	27.2
55t	Tertiary Education	34	21.0
55e	Employed	17	10.5

Question 56. (56u) Respondents' Children Who Use Computers

	n = 107	FD	%
0	No response	3	2.8
1	Have children who use computers	78	72.9
2	Have children who do not use computers	26	24.3

Question 57. Place Where Computers Were Used by Respondents' Own Children.

	n = 114	FD	%
57s	At school	37	32.5
57h	At home	52	45.6
57t	At tertiary education institutions	17	14.9
57o	At the office	8	7.0

Question 58. Purpose for Which Computers Were Used by Respondents' Own Children. n = 116

This was not coded. Answers ranged from "All they do" through "games" "fun" "play" "work" and "study" to "projects".

Question 59. Feelings of Parent-Respondents about the Use of Computers by Their Own Children.

59f

	n = 136	FD	%
1	Happy	126	92.7
2	Neutral	10	7.3
3	Unhappy	0	0.0

Obviously 29 respondents who were not yet parents answered this question, as well as the 107 who already had children of their own.

Question 60. Other than simply "to teach", what do you think is the main task of the teacher in the classroom?

This also was not coded, as the range proved too broad.

APPENDIX B: THE SURVEY INSTRUMENT

Faculty of Education
University of the Witwatersrand
Johannesburg
29 July 1991

Dear fellow-teacher

I am writing a research report as part of a Master's degree in Education. I have been teaching for a long time, and have become very interested in how teachers perceive and react to computers, which are now being used for various purposes in many high schools.

I would like to use this research report as an opportunity to find out **how high-school teachers perceive computers and their uses in education.** I know how busy you are, but would be most grateful if you would make the time to fill in the attached questionnaire quickly - it should not take longer than about 15 minutes. Please complete it, whether you feel strongly about computers (for or against) or not; a complete range of responses is needed to validate the research.

There are no right or wrong answers in this questionnaire, but even so the whole study is being done **anonymously**, because this allows each respondent to react with the **first thing that comes to mind** in response to each of the questions or statements. Neither your name nor that of your school will either be known in any way, or be involved in any aspect of this research.

Your principal has already agreed to help with the distribution and collection of these forms, and I will be providing each school involved with a copy of the overall findings.

Please respond honestly with whatever comes to mind naturally and first, no matter how silly your answer or reaction to some items might seem to you, and please don't go back to change any responses. Instinctive responses are by far the most valuable and important ones in a study like this.

Finally, please feel free to make any comments you like as you work through the questionnaire. I will appreciate all of them, and promise not to be offended by any of them!

Yours sincerely

Tony Thurman

Question 1. What is the first word or phrase that comes to mind when you hear the word "computer"?

Answer: _____

Before we go any further, I need to point out that the phrase "computers and their uses in education" covers at least six categories, namely:

1. The concept in general - largely with regard to the **relevance of Personal Computers** (PC's) and their place in education;

2. The use of computers to run the **school administration** packages currently available on the South African market;

3. The use of computers to run the standard applications packages (such as wordprocessors, spreadsheets, and databases) as **education management tools for teachers**;

4. The use of computers to familiarise pupils with these standard applications packages, and other programs already available commercially, in lessons known as **Computer Awareness** (or How To **Use** Computers);

5. The use of computers to cover the matric subject called **Computer Science** (or How Computers **Work**), which is more technical/theoretical, and includes learning one or more programming languages;

6. The use of computers as **a medium of instruction**, i.e. to teach other school subjects by running programs designed for this purpose. Such programs go under the generic titles of Computer-Assisted Learning (CAL) or Computer-Based Education (CBE).

For the next 19 items in this questionnaire, put a cross in the block which most nearly expresses your reaction to the statement made, according to the following scale:

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

Example: To use a computer you have to be able to program.

SA	A	U	D	SD

Question 2. Learning how to use a computer is too much trouble at this stage of my life.

SA	A	U	D	SD

Question 3. High-school pupils should be proficient in the use of computers for the standard applications packages such as wordprocessors, spreadsheets, databases.

SA	A	U	D	SD

Question 4. There is no scope for computers as a medium of instruction in my subject.

SA	A	U	D	SD

Question 5. Computers should be of use to teachers, just as they are to other professionals like accountants, doctors, and lawyers.

SA	A	U	D	SD

Question 6. If I use computers as a medium of instruction I will no longer be in control of the teaching/learning situation in my classes.

SA	A	U	D	SD

Question 7. The use of computers in education should be restricted to the use of school administration packages.

SA	A	U	D	SD

Question 8. Teachers should know how to use computers for the standard applications packages (e.g. wordprocessors, spreadsheets, databases).

SA	A	U	D	SD

Question 9. Teachers should understand the technology of how a computer works.

SA	A	U	D	SD

Question 10. Computers are too expensive to justify their purchase as teaching tools.

SA	A	U	D	SD

Question 11. Computers can improve the teaching/learning situation.

SA	A	U	D	SD

Question 12. I don't see how computers can help me do a better job.

SA	A	U	D	SD

Question 13. There are good computer programs available in South Africa which would be useful in teaching my subject.

SA	A	U		SD

Question 14. Computers are a threat to my self-esteem.

SA	A	U	D	SD

Question 15. Teachers and their pupils should be as comfortable with computers as they are with reading, writing, and arithmetic.

SA	A	U	D	SD

Question 16. Computers are a teaching tool, like an Overhead Projector or a Video Recorder.

SA	A	U	D	SD

Question 17. Using computers as a medium of instruction will lower academic standards.

SA	A	U	D	SD

Question 18. Computers as a medium of instruction have great potential.

SA	A	U	D	SD

Question 19. Computers will be the text-books of the future.

SA	A	U	D	SD

Question 20. Computers have more advantages than disadvantages for education.

SA	A	U	D	SD

Question 21. With reference to your perception of computers in general, into which **ONE** of the following four categories would you place yourself? Put a cross in the block next to the one you think is most appropriate.

positive	
negative	
unsure and hesitant	
ignorant and scared	

Question 22. In terms of your **experience** of computers, into which one of the following six categories would you place yourself? Again, put a cross in the block next to the **ONE** you think is most appropriate:

a complete novice	
a beginner	
had some experience	
had quite a lot of experience	
had considerable experience	
quite an expert.	

Question 23. The following five points are thought to be advantages of computers in general. Please rank them in importance very quickly by putting the number 1 in the block next to the point which you think is the **greatest advantage**, and working down to number 5 for the point which offers the least advantage:

General advantages of computers:	Ranking
Can store and access huge quantities of data	
Speed & accuracy of data access/calculations	
Storage of documents with ease of alteration	
Reduction of routine administrative burdens	
Simulation of problems for possible solution	

Question 24. Here are five general disadvantages in many people's eyes. Again, quickly rank them in importance by putting the **number 1** in the block next to the point which you think is the **greatest disadvantage**, and working down to number 5 for the least disadvantage:

General disadvantages of computers:	Ranking
Computers are unreliable	
There is inadequate data security/privacy	
Computers cost too much	
Not enough people know what's going on	
Computers are dehumanising	

Question 25. When it comes to the use of computers as a medium of instruction, there are also perceived advantages and disadvantages. Advantages first - please rank the following five advantages quickly, working from 1 (greatest advantage) to 5 (least):

Advantages as medium of instruction:	Ranking
The pupil has to be actively involved	
Computers offer individual record-keeping	
Computers have endless patience	
Computers do not make personal judgements	
Pupils work on their own, at their own pace	

Question 26. Here now are five perceived disadvantages of computers as a medium of instruction. Please rank them too from 1 (greatest disadvantage) to 5 (least):

Disadvantages as medium of instruction:	Ranking
Pupils cannot ask questions in their own way	
Pupils do not explore ideas with their peers	
There is no human mediation	
Who decides what is in the program?	
Programs cannot be changed to suit classes	

Question 27. The predominant use of computers in education today is administrative. Please rank the following administrative uses at your school, putting number 1 next to the one which is most valuable or important to you, and number 5 next to the least important:

Administrative uses in education:	Ranking
Processing marks and printing reports	
Producing marksheets with averages, etc	
Processing promotion schedules etc	
Keeping track of pupil and staff records	
Word-processing (notes, tests, exams etc)	

Question 28. Please rate your familiarity with each of the following computer applications, programs, and languages by putting a cross in the appropriate block for each one in the scale on the right:

Familiarity:	Proficient	Can use	Heard of	Unknown
Word-processing				
Spreadsheets				
Databases				
School Admin Package				
Logo/Turtle Graphics				

Question 28 continued	Proficient	Can use	Heard of	Unknown
Desk Top Publishing				
CAL/CBE				
Graphics				
Expert Systems				
DOS				
BASIC				
PASCAL				
C				
Other				

Question 29. Please put a cross in the block next to the **ONE** of the following eight categories that **BEST** describes your attitude to computers in education:

enthusiastic/very positive/impressed/interested	
enthusiastic but critical about use	
enthusiastic but worried about implications	
unfavourable/negative/unhelpful	
antagonistic/insecure/won't use computers	
indifferent/noncommittal/computers won't be used	
uninitiated/computers unknown entity	
not-mentioned/no opinion at all about computers	

Question 30. Please cross the "Yes" or the "No" block for **each** of the following:

	Yes	No
Have you ever used a Personal Computer (PC)?		
Do you still use one?		
Are you interested in learning more about how to use one?		

IF YOU NEVER USE A COMPUTER, PLEASE GO TO QUESTION 41 NOW.
Otherwise please continue with question 31.

Question 31. How long have you been using a computer?

Less than a year	
One to two years	
Two to five years	
More than five years	

Question 32. How often do you use a computer?

Almost daily	
Two or three times a week	
Once a week	
Once a month	
Very seldom	

Question 33. Where do you have access to a computer?
Please put a cross next to the **ONE** you use most often.

At home	
In the staffroom	
Elsewhere at school	
Outside school but not at home	
A portable	

Question 34. What computer training have you had?

Inservice training at school	
Preservice training at college or university	
A commercial training course of some sort	
None at all - self-taught	
Self-taught plus one of the above	

Question 35. Please put a cross next to EACH of these six categories of computer use in education in which you are in any way involved:

Interested in PC's in general and their relevance	
The use of school administration packages	
The use of standard applications packages (e.g. wordprocessors/spreadsheets/databases etc.)	
Computer Awareness - the use of computers to familiarise pupils with standard applications packages and other commercially-available programs	
Computer Science - the matric subject	
Computers as a medium of instruction - teaching school subjects with CAL or CBE programs	

Question 36. More specifically, what do you use a computer for most? Nine possibilities follow. First put a 0 next to any which are irrelevant in your case. Then put the number 1 next to the use you switch on for most often, and rank down (to number 9 if they all apply to you!)

I switch on a PC most often for:	Ranking
Using a wordprocessor	
Using a spreadsheet	
Using a database	
Updating pupil and staff records/marks etc	
Teaching Computer Awareness	
Teaching Computer Science	
Teaching my subject with CAL/CBE programs	
Games/Entertainment	
Other	
Only if you ranked "Other", provide details here: _____ _____ _____	

Question 37. If you use computers as a medium of instruction in your subject (i.e. you run CAL or computer-assisted-learning programs on computers in the course of teaching your particular subject) please provide details of those programs here:

	N/A

Question 38. Do you use any of the standard applications packages with your classes in the course of your school subject teaching?

Yes	No

Question 39. To the best of your knowledge, what is the difference between software and hardware?

Question 40. Please write two short sentences stating how you feel about using computers in each of the following two areas in your work as a teacher:

a) As management tools.

b) As a medium of instruction.

Question 41. Did you know before completing this questionnaire that:

	Yes	No
The only real requirement for learning to use a Personal Computer (PC) today is to be ready to try to type, even if only slowly.		
You do not have to be able to program in order to use a Personal Computer.		
The vast majority of programs for the PC do not demand specialist computer knowledge.		
Programs for the PC are readily available for many specific applications.		
PC's can simulate experiments and other classroom demonstrations involving movement and "What if?" adjustments.		

Question 42. For which of the following are computers used in your school?

	Yes	No	Don't know
Administration (reports, marks, etc)			
Wordprocessing by teaching/admin staff			
Spreadsheets by teaching/admin staff			
Computer Awareness/Familiarity			
Computer Science (matric subject)			
As an instructional medium to teach school subjects (CAL/CBE)			
To use applications (eg Wordprocessors Spreadsheets/Databases)in school subjs			
To produce the school newspaper (DTP)			
For Logo/Turtle graphics			
To write computer programs			
To control stock			
To send out accounts/statements			
By a computer club			
Other (Details please:_____)			

Question 43. How many computers are there in your school?

1	2-5	5-10	10-20	20+	No idea

Question 44. Is your school | Single-sex | Co-educational | ?

Question 45. Is your school | Private | Public | ?

Question 46. Would you describe the socio-economic background of most of your pupils as:

privileged	advantaged	ave	disadvantaged	underprivileged	?

Please bear with me over the next (and last) few questions if, like me, you are sensitive about them; but the answers to them are very important for the purposes of this study.

Question 47. How long have you been teaching?

1 year	2 to 5 years	5 to 10 years	10 to 20	20+

Question 48. What subject(s) do you teach?

a.	b.

Question 49. What standards do you teach?

Junior Secondary (6/7)	Senior Secondary (8-10)	Both

Question 50. What are your teaching qualifications?

Academic:	Bachelor's	Honours	Master's	Doctorate
Professional:	1 year diploma	4 year diploma/degree		
Other:				

Question 51. What subjects did you major in?

a.	b.

Question 52. Are you a female or male teacher? | F | M |

Question 53. Are you in your | 20's | 30's | 40's | 50's | older | ?

Question 54. Do you have children of your own? | Y | N |

Question 55. If so, are they at (cross whichever apply)

Pre-primary	Primary	High School	Tertiary Ed	Employed	?

Question 56. Do they ever use a computer? | Y | N |

Question 57. Where? | School | Home | Tertiary Educ | Office | N/A |

Question 58. What for? | | | | N/A |

Question 59. How do you feel about your children using a computer?

Happy	Neutral	Unhappy

Question 60. Other than simply "to teach", what do you think is the main task of the teacher in the classroom?

That's it. Thanks for the time and the help. I hope that in the end we all learn something from the exercise.

TABLE 1 — RESPONSES TO 19 LIKERT-TYPE STATEMENTS ON 5-POINT SCALE | PER & EXP

Field	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21p	22e
Mean	4.2	1.77	4.22	1.53	4.29	4.48	1.71	3.03	3.89	1.91	4.19	2.71	4.43	1.88	1.83	4.17	1.75	2.91	1.97		2.35
Std D	0.97	0.74	0.94	0.57	0.75	0.64	0.69	1.12	0.89	0.62	0.72	0.88	0.77	0.77	.64	0.75	0.63	1.01	0.74		1.09
Var	0.94	0.55	0.89	0.32	0.56	0.41	0.47	1.27	0.79	0.38	0.52	0.77	0.59	0.59	0.41	0.57	0.4	1.02	0.55		1.2
Frequency Distribution (n=214)																					
0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	1	0	0	0	1	0	0
1	5	80	3	106	1	0	85	17	3	45	0	19	2	65	57	0	74	18	49	169	62
2	14	110	13	10[illegible]	5	4	110	68	11	145	5	57	3	122	138	9	127	56	128	0	51
3	12	19	20	2	17	5	14	33	27	19	24	112	6	16	13	19	17	76	28	37	73
4	86	3	76	2	98	89	5	83	129	4	110	18	88	10	5	113	2	55	7	8	21
5	97	2	102	0	93	116	0	13	42	0	75	8	114	1	0	73	0	9	1	0	7
																					0
Field	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21p	22e

RESPONSES TO 19 LIKERT-TYPE STATEMENTS ON 5-POINT SCALE | PER & EXP

TABLE 2 — RANKINGS - COMPUTERS IN GENERAL | RANKINGS - COMPUTERS IN EDUCATION AS MEDIUM AND IN ADMIN

Field	23q	23a	23d	23r	23s	24u	24s	24c	24i	24d	25a	25i	25p	25n	25o	26q	26e	26m	26p	26s	27r	27m	27p	27t	27w
Mean	2.71	2.64	2.69	2.69	4.01	3.98	3.19	2.04	1.78	3.82	2.16	3.86	3.4	3.69	1.79	2.4	2.76	2.88	3.43	3.37	1.56	2.49	3.16	4.04	3.[illegible]
Std D	1.36	1.23	1.34	1.44	1.36	1.04	1.13	1.06	1.01	1.38	1.19	1.12	1.2	1.2	1.04	1.31	1.27	1.39	1.49	1.46	0.94	1.02	1.14	1.06	1.[illegible]
Var	1.84	1.51	1.8	2.07	1.86	1.07	1.28	1.12	1.01	1.89	1.42	1.25	1.44	1.44	1.08	1.72	1.62	1.93	2.21	2.14	0.89	1.03	1.31	1.13	2.[illegible]
Frequency Distribution (n=214)																									
0	2	3	4	3	3	2	3	2	3	3	1	2	1	1	1	1	2	3	3	2	4	4	4	3	3
1	47	45	48	59	15	6	14	71	105	17	73	6	14	12	107	67	40	43	30	32	132	22	12	7	41
2	57	49	49	38	19	9	34	87	61	19	76	14	33	22	68	58	51	43	32	30	49	94	37	8	13
3	42	56	43	48	21	34	79	32	39	36	33	53	64	49	16	42	59	47	27	36	17	62	81	21	25
4	38	50	50	34	38	89	57	14	11	49	16	62	55	63	11	25	39	47	52	48	8	23	52	97	19
5	28	11	20	32	118	74	27	8	4	99	15	77	47	67	5	21	23	32	70	66	4	9	28	78	9[illegible]
Field	23q	23a	23d	23r	23s	24u	24s	24c	24i	24d	25a	25i	25p	25n	25o	26q	26e	26m	26p	26s	27r	27m	27p	27t	27w

RANKINGS - COMPUTERS IN GENERAL | RANKINGS - COMPUTERS IN EDUCATION AS MEDIUM AND IN ADMIN

TABLE 3 — FAMILIARITY OF RESPONDENTS WITH VARIOUS APPLICATIONS

Field	28w	28s	28d	28a	28l	28t	28m	28g	28x	28o	28b	28p	28c
Mean	2.34	2.81	3.05	3.01	3.07	3.17	3.57	2.95	3.64	2.85	3.01	3.27	3.57
Std D	0.9	0.82	0.8	0.75	0.84	0.94	0.79	0.75	0.8	0.86	0.84	0.76	0.85
Var	0.81	0.68	0.64	0.57	0.71	0.88	0.63	0.56	0.64	0.75	0.71	0.58	0.72
Frequency Distribution (n=214)													
0	0	1	2	2	1	10	5	3	7	2	4	5	8
1	38	11	7	8	8	2	0	3	0	10	5	2	1
2	91	57	30	24	39	13	11	75	2	57	35	5	0
3	60	103	114	132	93	105	51	127	4	95	110	121	56
4	25	42	61	48	73	84	147	46	161	50	60	81	149
-													
Field	28w	28s	28d	28a	28l	28t	28m	28g	28x	28o	28b	28p	28c

FAMILIARITY OF RESPONDENTS WITH VARIOUS APPLICATIONS

WP
SS
DB

ATTITUDE and USE/INTEREST

Item	29a	30e	30s	30i
Mean	2.21	1.23	1.44	1.03
Std D	1.85	0.43	0.54	0.22
Var	3.42	0.19	0.29	0.05
Frequency Distribution				
0	0	1	5	2
1	109	162	109	203
2	47	51	100	9
3	23			
4	0			
5	0			
6	4			
7	20			
8	1			
Item	29a	30e	30s	30i

ATTITUDE/USE/INTERES

TABLE 4 — DETAILS OF RESPONDENTS' COMPUTER USE AND INVOLVEMENT

Field	31l	32f	33a	34t	35g	35a	35p	35f	35s	35m	36w	36s	36d	36r	36f	36c	36m	36g
Mean	1.54	2.04	1.31	2.3	0.45	0.18	0.32	0.16	0.03	0.14	0.81	0.56	0.34	0.6	0.23	0.05	0.25	0.62
Std D	1.43	1.93	1.4	2.04	0.5	0.38	0.47	0.37	0.18	0.35	0.99	1.16	1.01	1.21	0.87	0.53	0.96	1.22
Var	2.03	3.73	1.97	4.17	0.25	0.15	0.22	0.13	0.03	0.12	0.99	1.34	1.03	1.47	0.77	0.28	0.92	1.48
Frequency Distribution (n=214)																		
0	76	76	76	76	42	100	70	104	131	108	16	88	112	88	122	136	118	83
1	34	24	79	23	96	38	68	34	7	30	94	9	4	9	1	0	6	12
2	41	28	36	12	0	0	0	0	0	0	15	24	5	16	6	0	6	23
3	43	31	20	4	0	0	0	0	0	0	7	10	12	14	3	0	3	9
4	20	11	3	62	0	0	0	0	0	0	3	3	4	9	3	0	2	8
5		44		37	0	0	0	0	0	0	3	4	1	2	3	2	3	3
6											0	0	0	0	0	0	0	0
Field	31l	32f	33a	34t	35g	35a	35p	35f	35s	35m	36w	36s	36d	36r	36f	36c	36m	36g

DETAILS OF RESPONDENTS' COMPUTER USE AND INVOLVEMENT

TABLE 5 — RESPONDENTS' USE OF COMPUTERS IN THE CLASSROOM AND KNOWLEDGE

Field	37m	37cal	38a	39d	40a	40man	40b	40med	41t	41p	41k	41a	41s
Mean	1.11		1.21	1	0.67	0	1.02	0	1.14	1.13	1.2	1.1	1.38
Std D	0.96		0.94	1.04	0.67	0	1.01	0	0.41	0.39	0.46	0.37	0.53
Var	0.91		0.89	1.09	0.46	0	1.01	0	0.17	0.15	0.21	0.14	0.28
Frequency Distribution (n=214)													
0	76		76	89	14		5		5	4	5	5	5
1	16		15	65	111		72		174	178	161	182	123
2	122		123	32	7		36		35	32	48	27	86
3				28	6		25						
4													
5													
Field	37m	37cal	38a	39d	40a	40man	40b	40med	41t	41p	41k	41a	41s

RESPONDENTS' USE OF COMPUTERS IN THE CLASSROOM AND KNOWLEDGE

TABLE 6 — SOME DEMOGRAPHIC DETAILS OF SCHOOLS INVOLVED AND THEIR USE OF COMPUTERS

Field	42a	42w	42s	42f	42c	42m	42p	42n	42l	42e	42r	42g	42k	42det	43n	44g	45m	46s
Mean	1	1.36	1.66	1.49	1.71	1.98	1.92	2.08	2.25	2.21	2.29	1.55	1.94		8.85	1.7	1.84	1.74
Std D	0.18	0.76	0.98	0.82	0.92	0.88	0.93	0.86	0.89	0.92	0.91	0.91	0.94		8.21	0.51	0.46	0.73
Var	0.03	0.58	0.95	0.67	0.68	0.77	0.87	0.74	0.79	0.84	0.82	0.84	0.88		67.4	0.26	0.21	0.53
Frequency Distribution (n=214)																		
0	3	6	10	11	12	13	14	15	14	13	12	6	13	(0)	44	5	8	4
1	210	155	121	121	77	46	61	32	23	33	30	142	61	(1)	8	55	19	80
2	0	22	15	48	87	88	68	93	73	64	55	9	65	(2)	45	154	187	98
3	1	31	68	34	38	67	71	76	104	104	117	57	75	(5)	7			32
4														(10)	44			0
5														(20)	66			0
Field	42a	42w	42s	42f	42c	42m	42p	42n	42l	42e	42r	42g	42k	42det	43n	44g	45m	46s

SOME DEMOGRAPHIC DETAILS OF SCHOOLS INVOLVED AND THEIR USE OF COMPUTERS

TABLE 7 — BIOGRAPHICAL INFORMATION - RESPONDENTS' TEACHING BACKGROUND

Field	47t	48a	48sub1	48b	48sub2	49l	50e	50p	51maj1	51maj2	52g	53a	54c
Mean	7.71											3.07	
Std D	6.6											1.07	
Var	43.5											1.14	
Frequency Distribution (n=214)													
0	2	2	(+-20	109		2	53	26		4	2	2	
1	22	35	(differe	13		15	104	117		150		107	
2	52	74	(subject	28		63	48			60	83	105	
3	49	64		29		134	8				44		
4	50	11		5			1	71			69		
5	39	8		0							14		
6		20		30							2		
Field	47t	48a	48sub1	48b	48sub2	49l	50e	50p	51maj1	51maj2	52g	53a	54c

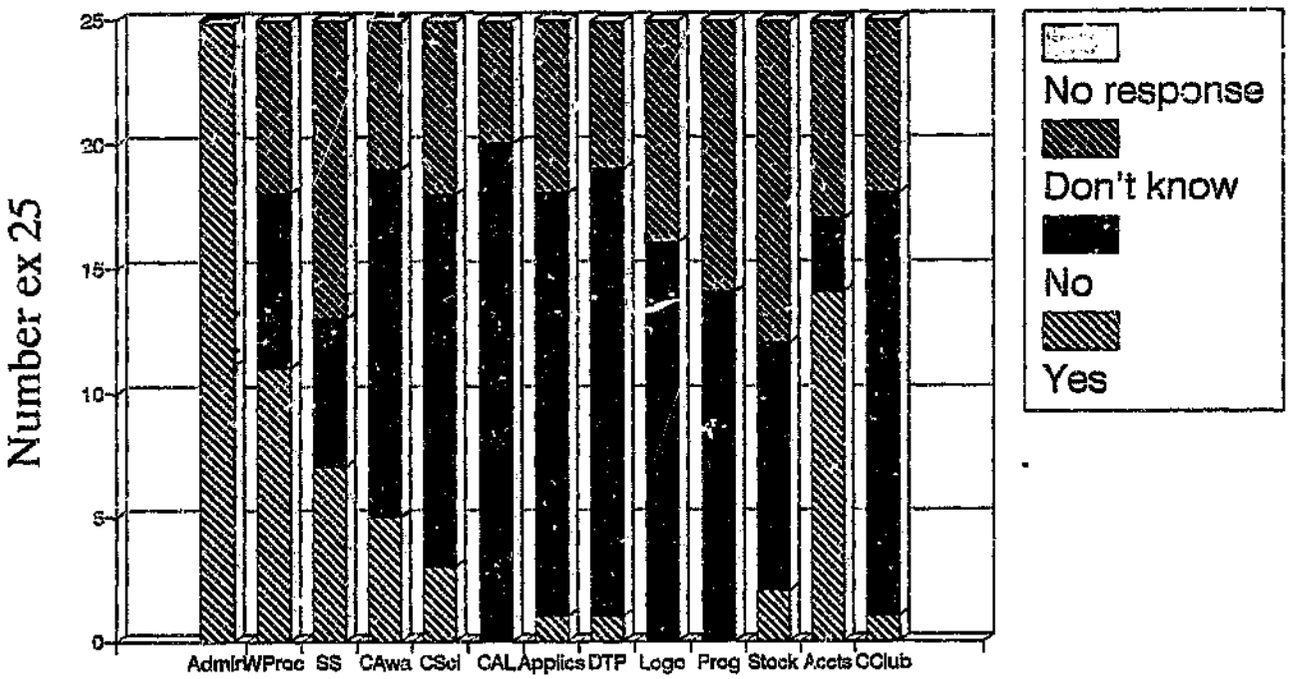
BIOGRAPHICAL INFORMATION - RESPONDENTS' TEACHING BACKG

TABLE 8 — RESPONDENTS' CHILDREN AND THEIR USE OF COMPUTERS | TEACHING &COMPUTER WOR

Field	55n	55p	55h	55t	55e	55a	56u	57s	57h	57t	57o	57a	58use1	58use2	58use3	58a	59f	60 word	01a	01
Mean																		1.59		
Std D																		0.85		
Var																		0.73		
Frequency Distribution (n=214)																				
0							106	110				77				74	78	23		
1							108	78				137				140	126	70		
2								26									10	92		
3																	0	29		
Total	25	42	44	34	17		37	52	17	8		71		36	9					
Field		55p	55h	55t	55e	55a	56u	57s	57h	57t	57o	57a	58use1	58use2	58use3	58a	59f	60 word	01a	01

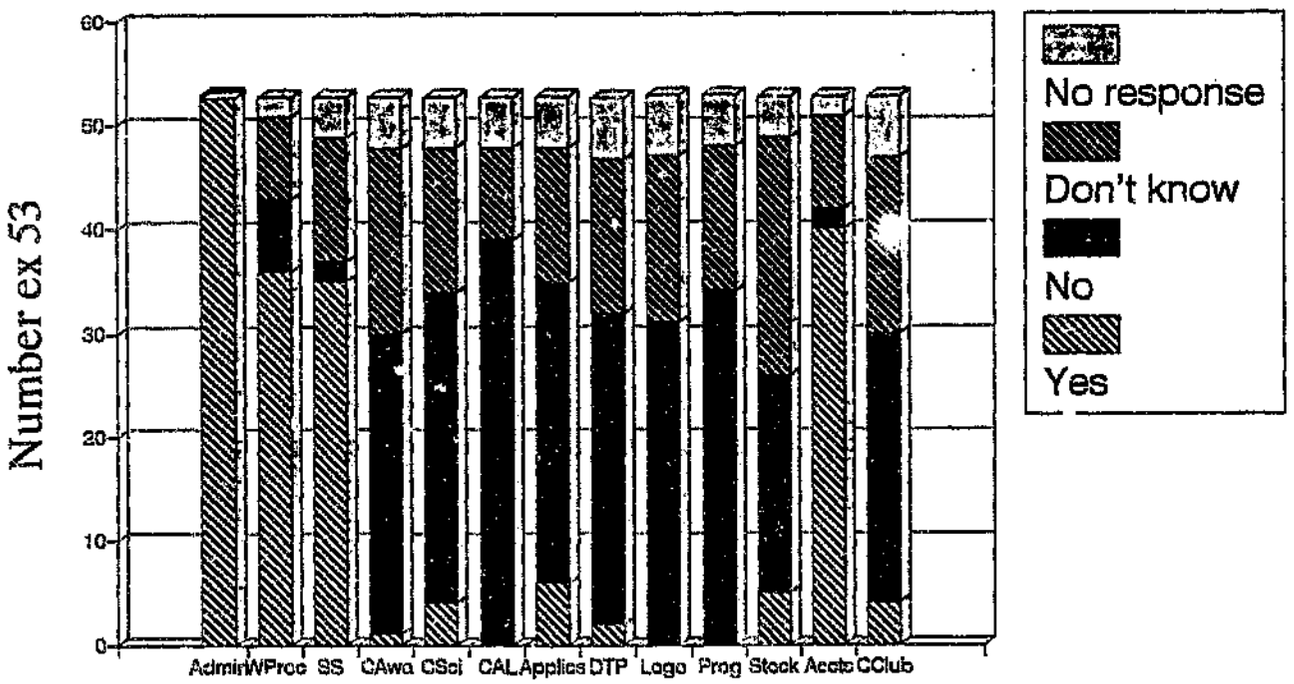
RESPONDENTS' CHILDREN AND THEIR USE OF COMPUTERS | TEACHING &COMPUTER WOR

GRAPH 14A
(Question 42 continued - School A)



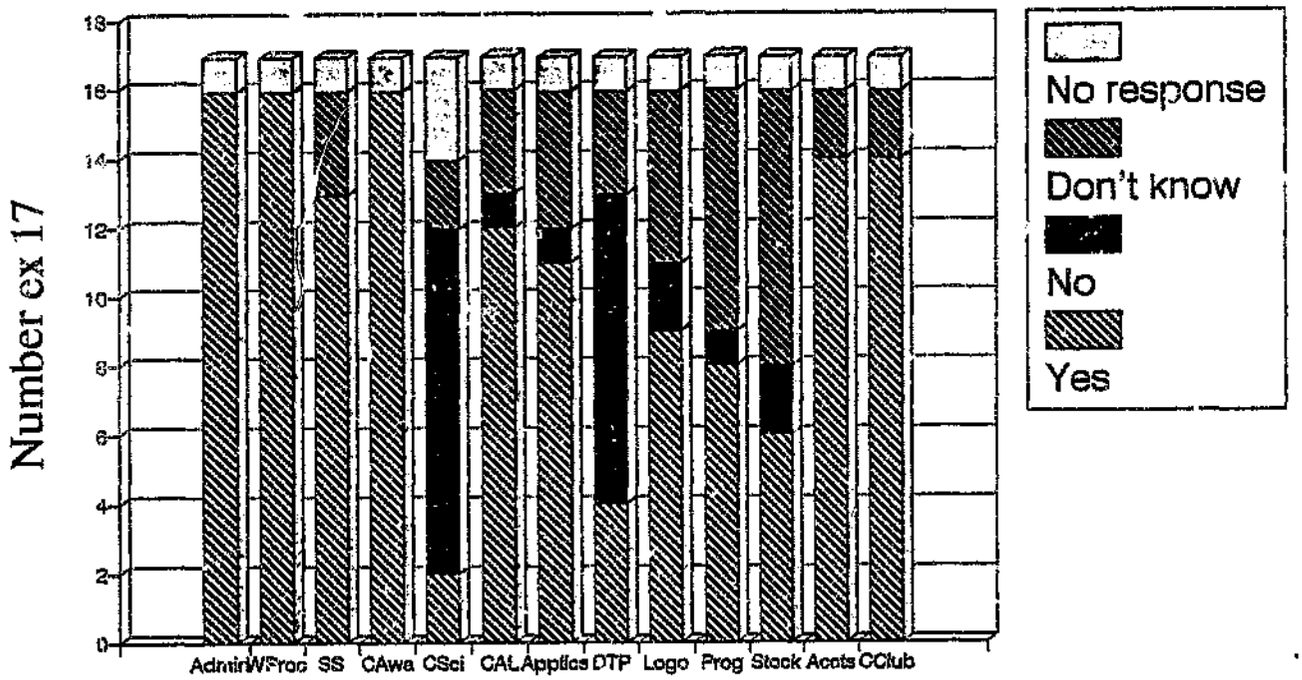
USE OF COMPS AT SCHOOL A - ACC TO RESPS

GRAPH 14B
(Question 42 continued - School B)



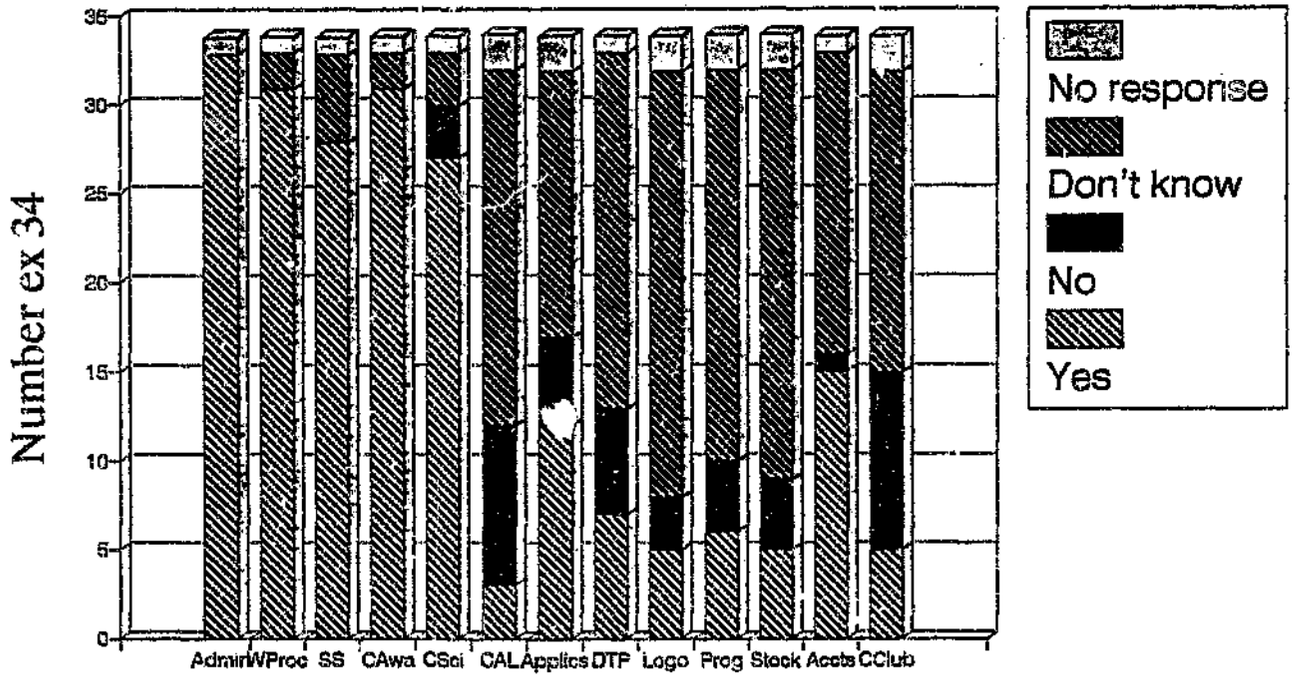
USE OF COMPS AT SCHOOL B - ACC TO RESPS

GRAPH 14C
(Question 42 continued - School C)



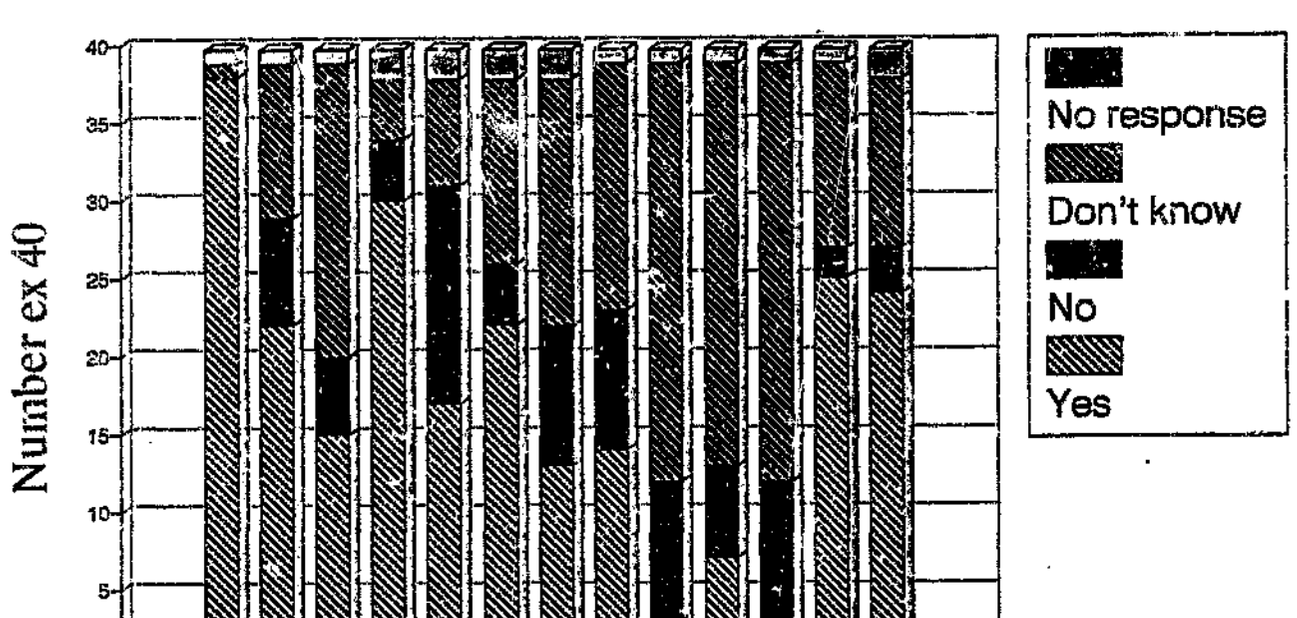
USE OF COMPS AT SCHOOL C - ACC TO RESPS

GRAPH 14D
(Question 42 continued - School D)



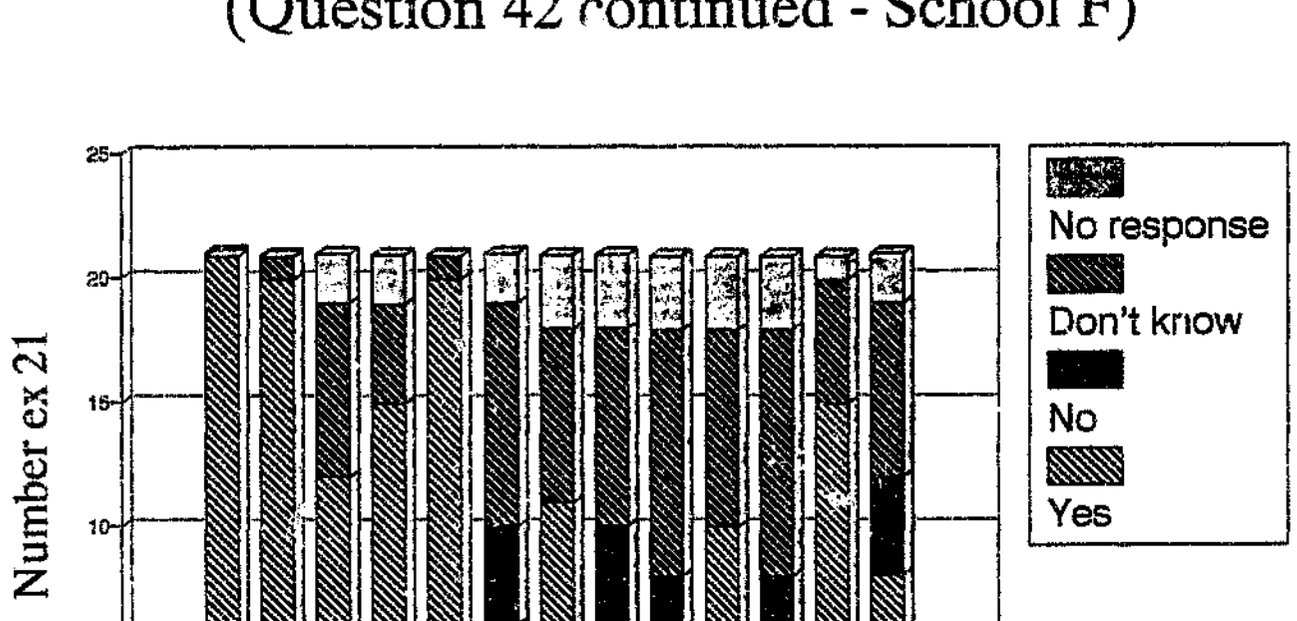
USE OF COMPS AT SCHOOL D - ACC TO RESPS

GRAPH 14E
(Question 42 continued - School E)



USE OF COMPS AT SCHOOL E - ACC TO RESPS

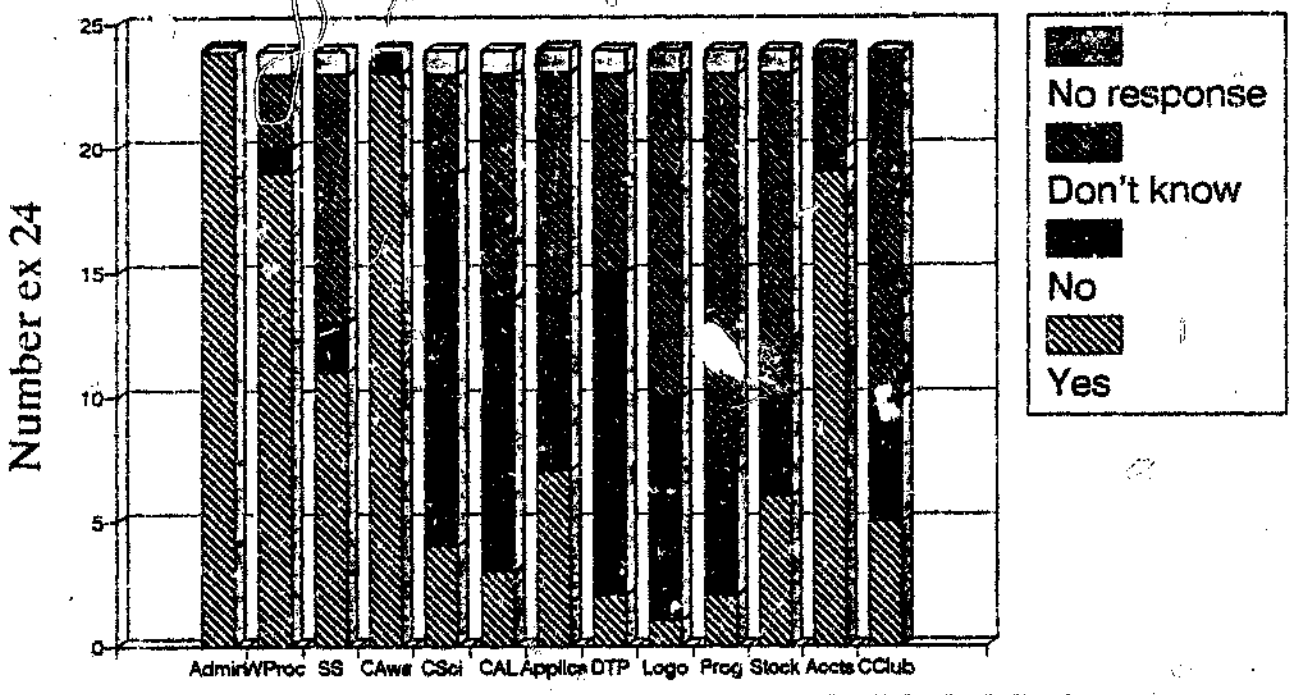
GRAPH 14F
(Question 42 continued - School F)



USE OF COMPS AT SCHOOL F - ACC TO RESPS

GRAPH 14G

(Question 42 continued - School G)



USE OF COMPS AT SCHOOL G - ACC TO RESPS

APPENDIX E.

A SELECTION OF ITEMS PROVIDED IN THE LITERATURE.

1. Abdel-Gaid et al (1986) - 23 validated items

(The vocabulary has been changed to South African equivalents, and the term "programming" omitted.)

1. Computers are as important to pupils as textbooks in the classroom.
2. Supplying every pupil with a computer is a worthy educational objective.
3. Computer courses should be required before pupils can matriculate.
4. Teachers should be required to take courses in computer use.
5. Using computers to tackle problems should become a basic school subject just like reading and mathematics (/arithmetic?).
6. Computers will require pupils to become active learners.
7. Computer instruction will deny pupils the opportunity to reason with others.
8. Teachers should demand that they be taught how to use computers in their classrooms.
9. Using computers as a teaching tool puts too much additional work on already overburdened teachers.
10. Learning how to use computers is not as important as learning how to read and do mathematics.
11. If we do not use computers in school teaching, our pupils will grow up deprived of a basic skill.
12. If my school had the money, I would insist that it buy computers for almost all school subjects.
13. Computers in classrooms will not improve children's attitudes towards subjects like Mathematics and Science.
14. Education authorities should make the use of computers in schools compulsory.
15. Children who use computers will have great difficulty in learning basic Mathematics skills.
16. Computers will increase the amount of stress and anxiety pupils (/teachers?) experience at school.
17. Education authorities should willingly invest the additional money needed to develop excellent computer software.
18. Computers will not make pupils better thinkers.
19. Computers in the classroom will lower academic standards.
20. Computers will decrease the amount of teacher-pupil interaction in schools.
21. Computers will isolate pupils from one another.

22. We should rethink how our educational curricula are organised, in order to make maximum use of computer technology.
23. I object to all the attention being given to computers because it detracts from the real problems currently being faced by teachers.

2. Manarino-Lettet and Cotton (1985) - 24 items covering 6 areas.

A. Computer Anxiety:

1. Computers are a threat to teachers' jobs.
2. Computers can be damaged easily.
3. Computers cause feelings of stupidity.
4. Computers are complicated.
5. Computers are valuable additions.
6. Computers are valuable teaching tools.
7. Computers are too much trouble.
8. Computers will enhance the teaching/learning process.
9. Computers are more disadvantageous than advantageous.
10. Computers have an impact on society.
11. Computers are frustrating.

B. Instructional Uses:

1. Computers should be used in all subjects.
2. Teaching Computer Literacy is the responsibiltiy of all teachers.
3. I prefer computer technology to more traditional methods.
4. Scheduling time for computer usage would be a problem.
5. I am not qualified to teach computer literacy.
6. I do not know how to integrate computer technology with traditional methods.

C. Use and Access:

1. Use -
   Never
   Very seldom (2-3 times total)
   Once a week
   Two or more times a week
   Daily
2. Access -
   No access
   Access to a school computer
   Computer in classroom
   Access to computer outside school
   Own a computer

D. Pupils' Use of Computers:

1. Pupils enjoy using computers.
2. Pupils should have more access to computers.

22. We should rethink how our educational curricula are organised, in order to make maximum use of computer technology.
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6. Computers are valuable teaching tools.
7. Computers are too much trouble.
8. Computers will enhance the teaching/learning process.
9. Computers are more disadvantageous than advantageous.
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   Very seldom (2-3 times total)
   Once a week
   Two or more times a week
   Daily
2. Access - No access
   Access to a school computer
   Computer in classroom
   Access to computer outside school
   Own a computer

D. Pupils' Use of Computers:

1. Pupils enjoy using computers.
2. Pupils should have more access to computers.

3. Computer usage will result in less personal treatment of pupils.
4. Pupils learn faster on computers.

E. Teachers' level of Training and Competence:

1. Training - None
Self-taught
Inservice training
Formal classromm training
Combination of the above
2. Competence - Beginner
Some experience
Quite a lot of experience
Considerable experience
No response

F. Teachers' Training Needs:

1. Teachers desire to learn more about computers.
2. Teachers refuse to learn about computers.
3. All teachers should learn to use computers.

3. **Gressard and Loyd (1985)** - A validated 30-item scale in three spheres - anxiety, confidence, and liking.

A. Computer anxiety:

1. Computers do not scare me.
2. Working with a computer would make me nervous.
3. I do not feel threatened when others talk about computers.
4. It wouldn't bother me to take computer courses.
5. Computers make me feel uncomfortable.
6. I would feel at ease in a computer class.
7. I get a sinking feeling when I think of trying to use a computer.
8. I would feel comfortable working with a computer.
9. Computers make me feel uneasy and confused.

B. Computer confidence:

10. I'm no good with computers.
11. I would feel OK about trying a new problem (/program?)on the computer.
12. I don't think I would do advanced computer work.
13. I am sure I could work with computers.
14. I'm not the type to do well with computers.
15. I am sure I could learn a computer language.
16. I think using a computer would be very hard for me.
17. I could get good grades in computer courses.
18. I do not think I could handle a computer course.
19. I have a lot of self-confidence when it comes to working with computers.

C. Computer liking:

20. I would like working with computers.
21. The challenge of using computers to tackle problems does not appeal to me.
22. I think working with computers would be enjoyable and stimulating.
23. Figuring out computer problems does not appeal to me.
24. When there is a problem in using a computer that I can't immediately solve, I would stick with it until I have the answer.
25. I don't understand how some people can spend so much time working with computers and seem to enjoy it.
26. Once I start to work with the computer, I would find it hard to stop.
27. I will do as little work with computers as possible.
28. If a problem is left unsolved in a computer class I would continue to think about it afterwards.
29. I do not enjoy talking with others about computers.

4. Bannon et al (1985) - 14 validated items.

A. Cognitive items:

1. Computers can improve learning of higher order skills.
2. Computers will improve education.
3. Computers can improve drill and practice.
4. Computers will create jobs needing specialised training.
5. Computers will improve health care.
6. A person today cannot escape the influence of computers.
7. Computers are a tool, just like a hammer or a lathe.

B. Affective items:

8. Computers will displace teachers.
9. Computers will dehumanize teaching.
10. Computers dehumanise society.
11. Computers can teach better than teachers.
12. Computers are beyond the understanding of the typical person.
13. Computers will replace low-skill jobs.
14. Computers make mistakes at least 10% of the time.

5. Elkins (1985) - 17 items covering three areas.

A. Using computers:

1. I am interested in learning more about using a computer.
2. I own or would like to own a computer.

3. I think I am capable of learning to use a computer.
4. I think I am the kind of person who would use a computer well.

B. Feelings about computers:

1. I would feel nervous using a computer.
2. Computers make me feel helpless.
3. I am afraid of computers.
4. Hearing others talk about computers makes me feel uneasy.
5. I would feel comfortable working on a computer.
6. Computers in everyday life bother me.
7. I feel computers control people.
8. I worry that my pupils may know more about computers than I do.

C. Computers in Education:

1. I use or would like to use a computer with my pupils.
2. All primary school pupils should use computers.
3. Computers should be used in school subjects besides Maths and Science.
4. Little use should be made of computers in education.
5. Learning about computers is important.

6. Stevens' 7 Statements (1982):

High-school students should understand the role computers play in society.
High school students should have some understanding about computers.
Do you feel qualified to teach computer literacy?
Teaching computer literacy is the responsibility of elementary or secondary teachers.
Computers provide more disadvantages than advantages in education.
Computers can be a useful instructional aid in almost all subject areas.
Computers in education almost always result in less personal treatment of students.

7. Chandra's eight categories (1984):

favourable/enthusiastic/verypositive/fascinated/interested
impressed/enthusiastic but critical about use
impressed/enthusiastic but worried about implications
unfavourable/negative/unhelpful/toys/no positive opinion
antagonistic/insecure/afraid/won't use computers
indifferent/noncommittal/unsure/neutral/comps won'tbe used
uninitiated/no real perception/comps unknown entity
not-mentioned/no opinion at all about computers.