Student Opinion and Occupational Circumstances relating to Aspects of Vocational Education and Training in Medical Laboratory Sciences

Thesis

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Student Opinion and Occupational Circumstances relating to Aspects of Vocational Education and Training in Medical Laboratory Sciences

A thesis submitted by

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Abstract

A group of medical laboratory technicians has been surveyed in order to determine ways in which the effectiveness of the existing arrangements and provisions for their education and training may be improved.

Information and opinion was obtained by questionnaire.
The survey population comprised all students attending courses in medical laboratory sciences at a regional college of technology during the academic year 1975 - 76.

The data obtained provides a portrait of the existing situation pertinent to the education and training of medical laboratory technicians.
The major characteristics of the survey subjects, the factors which influenced their entry to the career and their membership of the professional body, the arrangements and provisions made for their academic study and laboratory training and their opinions of these processes, and the perceived and desired interrelationship of college study and laboratory training, are described.

Analysis has been made of the influence of certain independant variables upon the provisions made for study and for training and upon students' opinions of the quality of these provisions.

Arrangements and provisions for college study are found to be well-established. The extent to which students were satisfied with study arrangements and facilities is shown to be significantly dependant upon their mode of college attendance. There is evidence of room for

improvement in several aspects of college study provision.

Laboratory training is shown to operate on a relatively casual basis. The amount of training provided and the manner of its provision is seen to be significantly dependant upon the type of course which students attended and upon the institution in which they were trained. There is evidence of room for improvement in the content, provision and regulation of laboratory training.

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Glossary of Abbreviations used in the Text and the Tables

A.H.A.	Area Health Authority
C.P.S.M.	Council for Professions Supplementary to Medicine
D.E.S.	Department of Education and Science
D.H.S.S.	Department of Health and Social Security
F.E.	Further Education
H.E.	Higher Education
H.N.C.	Higher National Certificate
H.N.D.	Higher National Diploma
I.M.L.S.	Institute of Medical Laboratory Sciences
I.M.L.T.	Institute of Medical Laboratory Technology (title superseded in July 1975)
L.E.A.	Local Education Authority
M.L.T.B.	Medical Laboratory Technicians Board (of the Council for Professions Suplementary to Medicine)
N.H.S.	National Health Service
O.N.C.	Ordinary National Certificate
O.N.D.	Ordinary National Diploma
R.C.P.	Royal College of Pathologists
S.F.I.M.L.S.	Special Examination for Fellowship of the I.M.L.S.
S.R.N.	State Registered Nurse
STM	Staff Training Memorandum (published by the N.H.S.)

Introduction

The phenomenal growth and development of the National Health Service in the twenty five years since 1952 has been accompanied by an expansion of the medical laboratory services which has been exceeded by no other paramedical service.

This expansion has had its base in dramatic discovery and innovation accompanied by enthusiasm and initiative in applying scientific principles and technical resources to the diagnosis and treatment of disease.

Of the workforce within the pathology service, which includes pathologists, medically and non-medically qualified scientists, medical laboratory technicians and a variety of ancillary workers, medical laboratory technicians are numerically by far the largest component and are largely responsible for the enormous number and variety of laboratory analyses which constitute the primary activity and function of N.H.S. laboratories.

Additionally, medical laboratory technicians contribute to research programmes involving laboratory investigations,and are responsible for the provision of laboratory-orientated teaching facilities within medical schools. Technicians occupying senior posts play a major part in the organisation and management of laboratories.

The enormous development of the laboratory service has been as notable in qualitative terms as it has in terms of quantitative output and has resulted in a level and variety of sophistication in analytical procedures, measurement techniques and instrumentation that is probably unparalleled in any other field of applied science.

Such changes have required, of necessity, substantial extension of the scientific knowledge and understanding, and technical skill and experience of the technicians concerned with such procedures.

From the recognition of these developing needs emerged the realisation that they could not be adequately met by existing arrangements. These were almost exclusively concerned with the development of the knowledge and skills necessary to qualify solely in terms of fitness to practice and were conducted entirely by practitioners who had themselves qualified in this way.
It was recognised that if new techniques and procedures were to be effectively exploited in the interests of the service, technician training of this sort required the support of a complementary scientific and general education which in practical terms could only be provided by the Further Education Service.
These conclusions led to the transfer, commencing in 1966, of medical laboratory technician qualifications into the National Certificate schemes, at first in respect of the initial qualification (O.N.C.) and subsequently in respect of the registrable qualification (H.N.C.).
Courses developed within the National Certificate schemes operated on a day release or a block release basis and contained three principal curricular components: study of the theoretical principles and applications of medical laboratory sciences; study of the applied sciences upon which these specialised disciplines are founded; study of elements of general education. Later there developed sandwich course variants(O.N.D. and H.N.D.) which contained essentially the same curricular compoments as day release and block release schemes.

At the same time the most advanced qualification in this profession, Fellowship of the Institute of Medical Laboratory Sciences, underwent substantial transformation, most notably from a dual-discipline to a single discipline format; syllabuses with a more recognisable academic structure were evolved and courses were developed on a more formalised basis. These latter processes are still incomplete.

In promoting these extensive changes, the responsible bodies involved emphasised that such courses could not and would not absolve the employing laboratories from their responsibilities for training in the knowledge and skills upon which fitness to practice depended. The medical laboratory was still seen to be the only place where technicians could be trained to an acceptable standard of competance in the performance of investigative procedures.
Training of medical laboratory technicians thus became a venture to which the hospital laboratory service and the Further Education Service were jointly committed and although the in-service training and the various components of college courses could be identified as separate objectives, it was seen that they could not be successfully attained in isolation. Effective co-ordination of college courses and laboratory training would be of paramount importance.

Since the changes described were initiated a variety of further developments have occurred. These may have significant effects on both the needs and the provision of training and education of technicians at the present time and in the future.
There has been notable evolution in the occupational role of technicians. Laboratory investigations have increased in number, variety and complexity and automation now is a significant feature in the work of most departments. There has been a general move

towards centralisation so that laboratories tend to be larger, more autonomous, with greater numbers of staff.
Patterns of recruitment have changed, with more trainees entering the profession with G.C.E. 'A' level and with degree qualifications.
Senior technical staff have acquired well-defined managerial roles and the machinery of State Registration has become firmly established and explicit guidance has been issued on in-service training.
Colleges have gained experience and developed expertise in providing courses appropriate to medical laboratory technicians and links have been established and liaison machinery set up between colleges and the laboratories from which students are sent.
Responsible sectors of the D.H.S.S. and the D.E.S. have adopted specific policies in respect of the provision of facilities for training and education.

In the face of these many changes, and some ten years after formal joint responsibility for the education and training of medical laboratory technicins was established, this investigation sets out to answer the question " how can the present arrangements and provisions for the vocational education and laboratory training of medical laboratory technicians be made more effective ?".
This question clearly pre-supposes the existence of defects or shortcomings within the present arrangements and provisions. While there is no obvious evidence of gross dissatisfaction on the part of the various agencies with particular interest in the education and training of technicians, it is believed that certain aspects of the present arrangements and provisions are more successful or satisfactory than others and that there is both need and opportunity for improvement.
In view of the vital part which medical laboratory technicians play within the medical services, it is essential that they are equipped

with knowledge, skills and experience of the highest quality. Investigation of the means by which the education and training devised to instil such knowledge, skills and experience, might be made more effective, therefore seems to be justified in the interests of the public, the laboratory service, the technicians themselves, and the profession to which they belong.

The processes of academic study and laboratory training are probably the predominant factors upon which the effectiveness of overall training will depend.

These processes operate, and may therefore be examined, as distinct mechanisms. Each requires investigation which explores quality of content and operational effectiveness. Current schemes of college study and laboratory training show considerable variation in operational mode and some comparative evaluation of this aspect may provide valuable guidelines for future improvement.

Although college studies and laboratory training may be viewed separately for the purposes of evaluation, the co-ordination and integration of these two components of the overall training process is seen to be of crucial importance. The manner and extent to which such co-ordination and integration is accomplished is believed to have a notable complementary influence upon college study and upon laboratory training, and may be a significant determinant of the success of whatever schemes of education and training students pursue.

For this reason, some study of the extent of this co-ordination and integration and the way in which it operates, is included in the investigation.

The present internal arrangements for academic study, laboratory training and qualification were not developed in a static external environment. External factors of a social, cultural or economic nature will almost certainly have had some influence upon the initial direction of the changes which have taken place and will probably continue to affect the relevance and appropriateness of certain aspects of the present arrangements and provisions. In particular, the changing pattern of secondary and higher education, employment opportunities, prevailing economic conditions and other socio-economic factors may have brought about, or may bring about in the future, changes in the qualifications, aptitudes and aspirations of recruits to the profession. Such changes may well necessitate modification of the present arrangements and provisions of education training and professional qualification, if the effectiveness of these processes is to be sustained or improved.

It would therefore seem that an investigation which aims to formulate recommendations for improvement of the effectiveness of medical laboratory technician education and training should take into account the qualifications and certain other primary characteristics of the young people who are currently entering the profession.

The internal environment within which student work and qualify also merits some attention, for the effectiveness of the education and training which they receive may be significantly influenced by the attitudes of those around them and by the encouragement and attention which they receive in their place of work. The investigation therefore attempts to make some assessment of the influence which the students places of work have upon the effectiveness of the education and training programmes to which they are subjected.

The field of study, when viewed as a whole, is clearly a very complex and elaborate one which embraces a multiplicity of elements which may influence the effectiveness of the educational and the training processes. Furthermore, distinctly different perspectives might be obtained according to whether enquiry is directed towards the organisations responsible for the direction and control of education and training, the employing organisations, the laboratory staff responsible for practical training, the college staff responsible for courses of academic study, or towards the student technicians themselves.

While all these different perspectives would contribute to a full understanding of the subject area, that of the student technicians is felt to be especially valuable. They constitute a single, central source of information and opinion with direct knowledge and first-hand experience of college courses and of laboratory training programmes, and are more likely to provide a view of the merits and defects of the present arrangements which is unaffected by political considerations or sectional interests.

A sample population of medical laboratory technicians pursuing academic studies and receiving training leading to recognised qualifications in medical laboratory sciences has therefore been chosen as the data source for this investigation.

Throughout the investigation, the maintainance of an appropriate balance between depth and breadth of enquiry and discussion has been a major problem. It is recognised that many aspects and issues within the subject area have not been exhaustively explored and will remain fertile ground for future study.

Chapter One

Historical Survey, Literature Review, and the Background to the Present Arrangements and Provisions.

Section 1. Historical Survey and Literature Review.

In March 1962 the Ministry of Health published Memorandum H.M.(62) 16, inviting employing authorities to give sympathetic consideration to granting student and junior medical laboratory technicians release from paid employment for attendance of classes during normal working hours. In gaining this concession, medical laboratory technicians were arriving relatively late to the principle of discretionary release from employment to attend formalised courses of vocational education. The system of National Certificates and Diplomas had been set up forty years earlier in 1922 and in 1962 38,951 students entered O.N.C. examinations and 16,689 students entered H.N.C. examinations.

A well-defined qualifying system for medical laboratory technicians had however existed for many years. Syllabuses and standards were established and examinations were introduced in the years following the First World War. Classes were conducted by senior medical laboratory technicians on a voluntary basis until they began to come under the auspices of Local Education Authorities during the Second World War (Valentine W.H. 1964).
They increased in size and number after 1945 but continued to operate as evening classes, taught mainly by practicing medical laboratory technicians possessing I.M.L.T. qualifications. These classes were almost exclusively devoted to the practical application of techniques and procedures of laboratory investigation, and served mainly to

consolidate and to extend rather than to complement and support training received by the technician in his place of work. These arrangements remained virtually unchanged until 1963.

In publishing Memorandum H.M.(62)16 the Ministry of Health gave recognition to a need that had long been recognised in other quarters (Gazette of the I.M.L.T. August 1963 page 155). It was a response to events which had already been seen to indicate the direction which training and education for medical laboratory technicians would soon take.

As early as 1948 the I.M.L.T. had set up a Joint Committee on Further Education and Training and in 1954 this body had put forward specific proposals urging the extension of part time day release to medical laboratory technicians. It continued to press for this general provision until 1962.

The traditional apprenticeship-like pattern of training which had seemed adequate before the Second World War, when there had been relatively slow growth and little change in the practice of medical laboratory technology was no longer satisfactory. Properly integrated training with much closer collaboration between colleges and employers was now essential (Davey W. 1964).

The laboratory service, like most other sectors of the Health Service exhibited a rate of growth and development following nationalisation in 1948, that had not been known in any other period of similar duration. This expansion had been remarkable in terms of the resources used, the deployment of staff and the increased use of technology (Warlow D. 1974).

The magnitude of this expansion is clearly shown in statistics published in a number of official reports.

The Public Health Laboratory Service Annual Report (1968) shows that during the years between 1948 and 1962 its number of constituent laboratories increased from 36 to 59 (a 63% increase), that numbers of technical and other non-graduate staff rose from 562 to 956 (an increase of 70%) while the number of specimens examined in 1962 (2,314,126) was 191% greater than the number (793,314) examined in 1948.

Ministry of Health Annual Reports for 1967 and 1968 record similar increases over the same period in the number of laboratories, the technical staff employed and the number of tests undertaken.

Keep A.G. (1969) also noted an increase of pathology requests in excess of 9% per annum during the latter years of the period in question.

In a House of Commons Debate on the National Health Service (Paramedical Professions) Dr.David Owen, then Under Secretary of State for Health, summed up these changes in his reference to "the massive expansion of these professions since 1949".

The greatly increased demand for and provision of medical laboratory services involved more than simple quantitative changes.

In the sphere of laboratory medicine the period in question was characterised by very rapid growth of new knowledge, new techniques and new instruments, the rate of discovery being such that methods were almost obsolete before they had become standardised. There was also every indication that such growth would continue in the forseeable future. (Davey W. 1964)

In these circumstances it was recognised that the more useful technicians would be those that understood scientific principles applicable in a variety of situations, this being more valuable than their being drilled in the automatic manipulation of technical procedures which may become rapidly outdated. The desirable qualities for a good medical laboratory technician would be clarity of understanding, technical ability and versatility and it was seen that such qualities could only be obtained by merging an appropriate balance of scientific education and technical training (Gazette of the I.M.L.T. August 1963 page 156).

While it was seen that a comprehensive grounding in medical laboratory practice could be obtained effectively only within a medical laboratory, it was felt to be essential that the college course should be complementary to this training, providing an adequate educational and scientific background to the work of the technician.

An important factor which did much to create a climate appropriate to the recommendations embodied in Ministry of Health Memorandum H.M.(62) 16 was the 1961 White Paper entitled "Better Opportunities in Technical Education". This was aimed at a major reconstruction of the existing system of courses for technicians, craftsmen and operatives in technical colleges in England and Wales. In this document the main proposals which were to affect medical laboratory technicians were:

1. Students should start at a technical college immediately after leaving school and courses in evening institutions should be eventually discontinued.
2. Courses should include National Certificate and Diploma schemes for students aiming to become at least high grade technicians.
3. Technicians courses should be devised for particular industries.
4. The standard of entry should be raised.
5. More time should be provided under day release schemes and no student should have to rely wholly on evening study.

6. Sandwich courses and block release courses should be increasingly developed.

During the three years following the publication of Memorandum (62)16, as Health Authorities implemented its recommendations, the Further Education Service responded to the proposals contained in the White Paper and in respect of medical laboratory technology this led to the introduction of day release courses in place of evening courses for students preparing for Intermediate Examination of the I.M.L.T..

These courses were based on a new syllabus devised by the I.M.L.T. and included studies in chemical and physical sciences, mathematics and statistics, and cell biology, in addition to the applied medical laboratory techniques of the existing Intermediate Examination syllabus..

This arrangement proved to be an interim measure for by 1966 " agreement had been reached by the Societies, Departments sponsoring Ordinary National Certificates and Diplomas in Sciences, and the Institute of Medical Laboratory Technology that in future the educational needs of medical laboratory technicians in England and Wales and Northern Ireland, up to the level of the I.M.L.T. Intermediate Examination should be met through arrangements for National Certificates in Sciences" (Department of Education and Science. Provisional Rules 109 and Notes for Guidance 1966).

F.E. colleges responded promptly to this statement. By August 1967 the number of colleges offering the Medical Laboratory Sciences variant of the Ordinary National Certificate in Sciences exceeded the number offering day release I.M.L.T. Intermediate courses and by 1968 the transition was complete with some sixty six colleges offering the new course.

At this time and in the years immediately following, a small number of colleges introduced a Medical Laboratory Sciences variant of the

Ordinary National Diploma in Sciences. These sandwich courses comprised of a two year programme involving college study similar to that of the Ordinary National Certificate courses together with periods of work-based experience and training in medical laboratories.

During this period a similar pattern of development was emerging at the more advanced level of study and qualification in medical laboratory technology.
Since the end of the Second World War, holders of the Intermediate Certificate of the I.M.L.T. had been able to proceed to higher qualification by Final Diploma of the I.M.L.T.. This was attained by examination in one of four, and later six main disciplines in medical laboratory technology namely, Bacteriology, Blood Transfusion Technique, Chemical Pathology, Haematology, Parasitology and Virology. Such an award conferred upon the holder Associateship of the I.M.L.T. and allowed upward movement in the Whitley Council grading structure for N.H.S. professional and technical occupations. Entry to these examinations required two years study and further experience in medical laboratories approved for the purpose by the I.M.L.T. Attendance of organised courses of study was not obligatory but during the 1950's and 1960's courses on an evening class basis became well established in major centres throughout the country.
Like the Intermediate Certificate, Final Dilpoma courses and examinations were concerned almost exclusively with the principles and practice of the highly specialised laboratory procedures of the respective disciplines and did not include distinct areas of supportive science.
Diplomates gaining Associate Membership of the I.M.L.S. by this means were able to pursue Fellowship of the I.M.L.T. and upgrading to the more senior posts within the Whitley structure by obtaining a

second Final Diploma in an alternative discipline after a further two years of study and approved laboratory experience.

This arrangement reflected the multidisciplinary approach which at that time appeared to most effectively meet the needs of the laboratory service which at that stage of development, commonly employed staff in a multidisciplinary role, particularly in the smaller establishments.

For a small minority of Associates of the I.M.L.T., an alternative pathway to Fellowship was provided by means of dissertation or thesis in an area of the subject which the candidate had studied prior to Associateship examination. This route was followed mainly by technicians employed in single-discipline establishments where there was little opportunity for study or experience in a second discipline.

Although it appeared that a growing number of Associates wished to pursue Fellowship by further specialisation in the subject studied for Associateship, Fellowship qualification by dissertation or thesis attracted only a small proportion of candidates.

As a consequence the I.M.L.T. introduced in 1965 the Advanced Examination for Fellowship - "an examination at a higher level in the subject in which the candidate qualified as an Associate .... which would meet a widespread need often expressed by technicians and heads of departments"(Gazette of the I.M.L.T. January 1964 page 6).

The introduction of this new route to Fellowship, which by 1967 had been renamed the Special Examination for Fellowship was followed within a few years by its acceptance as the normal route to Fellowship of the I.M.L.T..

As well as being thought more appropriate to technicians needs and service requirements at a time of rapid development and expansion, the creation of a quite separate and distinct pathway to Fellowship of the I.M.L.T. allowed the Final Diploma to be related exclusively to Associate qualification. The way was now open for the introduction of courses on a day release or block release basis leading to Associateship of the I.M.L.T., thus implementing the full recommendations of H.M.(62) 16 which had stated that consideration should be given to the discretionary release with pay for attendance at classes during normal working hours, of junior as well as student technicians.

The I.M.L.T. immediately published tentative proposals for schemes of study on a day release basis which would lead to Associateship examinations and which contained defined scientific subjects in addition to specialised technical subjects.

Although a number of colleges responded to this development by offering day release courses based on the I.M.L.T. proposals, these provisions were almost immediately overtaken by events.

In 1965 an Advisory Working Group comprising of representatives of the I.M.L.T., the College of Pathologists, the Joint Committee for O.N.C. and O.N.D. in Sciences, the Department of Education and Science and the Scottish Education Department was established with the purpose of enquiring into the feasibility of National Certificate arrangements for medical laboratory technicians. The Group concluded that such schemes would be appropriate and made recommendations with regard to the desirable content and structure for schemes at both Ordinary and Higher levels. As a result of the agreement reached by this Group, provision had been made for Medical Laboratory Sciences to be offered, from 1966, as an elective subject of the Ordinary National Certificates and Diplomas in Sciences.

The report of this Working Group also contributed to the subsequent establishment in 1967 of a Joint Committee for Higher National Certificates and Diplomas in Medical Laboratory Subjects and to arrangements whereby part time day release courses leading to the

Associate Examination of the I.M.L.T. could be superseded by Higher National Certificate courses with effect from September 1967.

Almost half of the colleges which had offered courses for Associate Examination immediately replaced these with H.N.C. courses in Medical Laboratory Subjects and the proportion had risen to almost three-quarters by the following year.

The I.M.L.T. recognised that retention of its Final Diploma award for Associateship would be necessary for some time in order to accomodate technicians who had either already embarked upon Final Diploma study or who had attained Intermediate Examination of the I.M.L.T. rather than O.N.C. or O.N.D. and were thus not necessarily qualified to enter H.N.C. courses.

Accordingly, the Final Diploma route to Associateship was retained until 1975 and up to that time, many colleges offered H.N.C. courses and Final Diploma courses.

A further development at this level of qualification occurred in 1973 when three colleges, two in England and one in Wales, were given approval to introduce Higher National Diploma courses in Medical Laboratory Subjects in the form of sandwich courses.

School leavers entering the courses directly with minimum qualifications of one G.C.E. 'A' level pass in an appropriate science subject, completed during the three year course, college studies similar to those of H.N.C. and also received training in approved laboratories during prescibed periods throughout the course.

The award of Higher National Diploma together with evidence of satisfactory completion of laboratory training placed these students in the same position as technicians who attained H.N.C. by part time study and received satisfactory training during their employment in approved medical laboratories.

They were thus eligible for Associate Membership of the I.M.L.T., State Registration by the Medical Laboratory Technicians Board of the Council for Professions Supplementary to Medicine and employment at Technician grade in National Health Service laboratories.

Since their inception, H.N.D. courses have been restricted to the three colleges which were originally approved. They were initiated on an experimental basis as an alternative to the employment based H.N.C. pathway to qualification and they have yet to be fully evaluated.

The introduction of National Certificate and Diploma schemes had separated quite clearly the routes to Associateship and Fellowship of the I.M.L.T.

Fellowship qualification was now provided for by courses of study arranged in a number of major centres on an evening class, day release or block release basis. Studies and the examinations to which they led had been established at a level beyond that of Associateship (H.N.C. or H.N.D.) and approval of syllabuses and the control of examinations remained the exclusive responsibility of the I.M.L.T.

In 1975 the I.M.L.T. published revised study guides for Fellowship Examination and made recommendations concerning the desirable length and structure of courses.

At this time also, agreement was reached between the Department of Health and the I.M.L.T. permitting, within the discretionary limits of Staff Training Memorandum 47/70, local arrangements which allowed students to attend such courses.

The possible points of entry for recruits into medical laboratory technology were significantly affected by the changes in educational arrangements.

Prior to the transition to National Certificate schemes, the great majority of recruits entered the profession with G.C.E. 'O' level qualifications and pursued studies over three years, leading to the

Intermediate Examination of the I.M.L.T.. A small proportion of technicians were recruited with G.C.E. 'A' level qualifications but owing to the essentially technical and applied nature of the studies leading to the Intermediate Examination, exemption from that qualification was permitted only to those recruits holding G.C.E. 'A' level in Chemistry, and then only for the purposes of entry to Associate courses in Chemical Pathology.

With the advent of the National Certificate schemes, which were concerned at the Ordinary level much more with appropriate basic sciences and much less with the applied technical subjects, G.C.E. 'A' level exemption from O.N.C. or O.N.D. was more practicable and acceptable and appreciable numbers of recruits having the necessary 'A' level qualifications began to appear as direct entrants to H.N.C. courses. Although the Joint Committee for Higher National Certificates and Diplomas in Medical Laboratory Sciences suggested the provision of some supplementary study for such entrants, recruits with appropriate G.C.E. 'A' level qualifications are known to have pursued the normal H.N.C. course to no apparent disadvantage.

Entry to I.M.L.T. Final courses for the purposes of Fellowship Examination by virtue of possession of degree qualifications was very rare indeed. Prior to the present decade it appears that the public regard for the profession and also the salaries and other occupational conditions of medical laboratory technicians were such that the career held little attraction for university graduates and almost all technicians entering courses leading to Fellowship of the I.M.L.T. did so by virtue of their having gained Associateship of that body by examination.

With the introduction of National Certificate schemes, H.N.C. became the normal entry qualification for courses leading to Fellowship and this position was unaffected by the re-naming of this qualification as Special Examination for Fellowship.

Possession of a science degree of a British university was however also specified as an acceptable entry qualification to the Special Examination for Fellowship of the I.M.L.T., provided the candidate had completed a satisfactory period of training in an approved medical laboratory.

This arrangement introduced a clearly defined, direct route for graduate entry to the profession.

Since its formation , the I.M.L.T. has recognised a responsibility for the promotion of up-to-date practice, the maintainance of high standards of professional competance and conduct, and the advancement of the knowledge of practitioners of medical laboratory technology.These objectives are clearly stated in the Memorandum of Association of the I.M.L.T. which was formulated in 1942.

During the subsequent twenty years, the I.M.L.T. accepted sole responsibility for the formal pursuit of these objectives.

At that time the study syllabuses for the I.M.L.T. Intermediate and Final Examinations were predominently concerned with the principles and practice of the applied techniques and procedures of medical laboratory technology and these examinations, in which the testing of practical competance and ability constituted a major feature, placed upon employing departments an implicit obligation for the training of technical staff.

At that time, I.M.L.T. qualifications were also accepted by employing authorities as valid indicators of occupational competance to the extent that within the Health Service they were, up to the Technician grade, the sole determinants of career grading and promotion.

The I.M.L.T. had also set up a Board of Studies which monitored the training technicians received and from time to time made certain recommendations regarding its adequacy and effectiveness as reflected by results of examinations.

The I.M.L.T. also introduced a mechanism of approval of laboratories which it deemed fit to provide the experience and training necessary for students preparing for Intermediate and Final Examinations. These measures which the I.M.L.T. took to promote training of a suitable standard and quality were however pursuasive rather than mandatory. It could not insist upon students completing the recommended programmes of study or training prior to their entry to its examinations. Neither did it have statutory powers permitting entry to laboratories for the purposes of assessing their suitability as training centres.

In spite of these constraints, an increasing amount of attention was given to technician training during the years following the Second World War. In this the efforts of the I.M.L.T. were almost certainly aided by the increasing clinical demand for better and more comprehensive laboratory services.

Approval was sought for laboratories, probably because it was recognised that by improving the quality of technician training, the quality of work carried out would be enhanced, so providing an improved service.

Students were encouraged to attend recommended study courses which were usually organised and taught by experienced senior technical staff on a voluntary basis.

Senior staff within laboratories recognised that effective training would benefit not only the service but also the profession and many devoted considerable time to the provision of instruction and adequately wide laboratory experience for student technicians.

The profession thus entered the 1960's with a strong and active

professional body having captive membership of all medical laboratory technicians wishing to pursue or retain I.M.L.T. qualifications.
As these qualifications were the sole academic criteria upon which were based the career structure and grading within the National Heath Service as well as several other institutions, virtually all medical laboratory technicians employed within these organisations were members of the I.M.L.T. from the beginning of their career and throughout their professional life.
Most medical laboratories except very small or very specialised departments, undertook student training beyond the immediate needs of the job.
Although this training, supplemented in most major centres by evening courses, appeared to be generally satisfactory in terms of preparing students for I.M.L.T. examinations, it lacked central control and formal supervision and as a consequence, considerable variation in standards was possible.
The transition during the period between 1967 and 1970, from I.M.L.T. Intermediate and Final courses to Ordinary and Higher National Certificate courses appears to have affected the training of medical laboratory technicians in two important ways.
Firstly, it was recognised that "National Certificate courses were not intended to provide just a vocational training on an apprenticeship basis. College courses should be complementary to the sound grounding in medical laboratory practice which could only be obtained in a medical laboratory"(Gazette of the I.M.L.T. August 1963 page 156).

Students were thus to be as much, if not more, dependant upon their employing department for the provision of adequate and satisfactory training as they were when I.M.L.T. Intermediate and Final courses had been in operation.

Secondly, it had been noted by the Board of Studies of the I.M.L.T. (Gazette of the I.M.L.T. April 1962 page 296), that "the increase in facilities and tuition at evening classes had coincided with a decrease in the exercise in training responsibilities in the laboratories where students were employed".

There appeared to be an impression in some quarters that the introduction of improved educational arrangements tended to absolve employing departements of their responsibilities for student training, while the nature of the changes were such that employers training responsibilities were if anything, even greater than before.

It appeared that in addition to the provisions that had been made for the developing needs of technicians in terms of their scientific education, measures were also required to ensure that technical training in the on-job situation received consistently adequate and effective attention.

Such measures were embodied in the provisions of the Professions Supplementary to Medicine Act which received the Royal Assent in October 1960. Under the Act, Professional Boards were to be set up for each of the professions covered by the Act. The general functions of the Boards were "to promote high standards of professional education and conduct" and among their more specific functions was listed "to approve courses of training, institutions and qualifications" and "to supervise approved institutions and examinations" (Gazette of the I.M.L.T. July 1962 page 342).

In addition to its other important responsibilities, the Medical Laboratory Technicians Board of The Council for Professions Supplementary to Medicine thus assumed responsibility for the supervision of training arrangements for technicians and under Section 4 (i) (c) of the Act, possessed statutory powers to "refuse approval to an institution which is not properly organised and equipped for conducting the whole or any part of a course of training approved by the Board".

The I.M.L.T. did not however abandon its responsibilities for the maintainance of standards of laboratory training and participated, through a Joint Committee with the Medical Laboratory Technicians Board, in the investigation of laboratories seeking initial or continued approval (Gazette of the I.M.L.T. September 1967 page 247). In May 1972 the I.M.L.T. published recommendations concerning laboratory based training which had been jointly agreed by the Department of Health, the I.M.L.T. and the Royal College of Pathologists and in September 1974 an almost identical document, issued as a paper by the Medical Laboratory Technicians Board and agreed with the Health Departments, the Department of Education and Science, the Public Health Laboratory Service, the Royal College of Pathologists and the I.M.L.T., had been circulated by the Department of Health and Social Security as Staff Training Memorandum (74) 29. In addition to detailed programmes of training in the four main specialist disciplines, the document described comprehensively the arrangements and provisions considered necessary to ensure consistent standards of practice. It emphasised the distinction between laboratory training and vocational education and stressed that laboratory based training must be provided in addition to courses offered in Further Education establishments and should not give rise to any major modifications in Ordinary and Higher National Certificate and Diploma courses, the purpose of which is accepted to be a vocational education in the general and applied aspects of science in laboratory medicine.

A further significant feature of this document and of the similar document published earlier by the I.M.L.T. was that their recommendations were related primarily to the training of Junior Technicians who were pursuing H.N.C. or H.N.D. and little direct reference was made to the training needs of Student Technicians who would be following O.N.C. or O.N.D. courses. This is likely to be a result of the identification of H.N.C. or H.N.D. qualification, together with the necessary concurrent laboratory based training, as the pre-requisites for State Registration and Associateship Membership of the I.M.L.T.. The increasing numbers of recruits entering the profession with G.C.E. 'A' level qualifications, which made them eligible for direct entry to H.N.C. or H.N.D. courses and for State Registration after two years of approved training, probably had some influence on the focus of attention to training moving to the more advanced level.

While the Medical Laboratory Technicians Board of the Council for Professions Supplementary to Medicine has most specific responsibilities concerning the provisions made for technician education and training to the standards necessary for State Registration, its responsibilities relating to Registered Technicians are concerned primarily with professional conduct.

Standards of post-Registration education and training continue to be determined by the I.M.L.T. through the entry requirements laid down for the Special Examination for Fellowship of the I.M.L.T. At the time when this survey was undertaken the I.M.L.T. was actively pursuing improved provisions for technicians preparing for the Fellowship Examination (Gazette of the I.M.L.T. Sept.1976 page 372).

Prior to the changes with which this investigation is particularly concerned there appears to have been little recorded research into the occupational needs of medical laboratory technicians and the strategies which might provide for such needs.

Work carried out after 1962, during the interactive period for the innovation which forms the central theme of this investigation, is also rather limited and falls into two categories, neither of which parallel the present investigation to an extent which permits extensive close correlation of findings. They do however make some references which are relevant and in such instances their observations or recommendations are taken into account.

In the first case, The work of Crichton A. and Crawford M.P.1963, of Zuckerman S. et al 1968, of Warlow D. 1974 and of McCallum R. 1973 led to reports which were primarily concerned with issues which extend much beyond the scope of the present investigation.

Crichton and Crawford reported upon a survey of 1,176 Professional and Technical Staff in the Hospital Service in Wales in 1963. The survey was predominantly concerned with occupational attitudes held by Professional and Technical Staff and referred particularly to personnel management problems and staff wastage. Among their observations they noted that "medical laboratory technicians were mostly working class boys" who were "trained as apprentices and the training was consequently cheaper than for other careers". The report also noted tha that in the year preceeding the survey, recruitment had been accelerate accelerated and a number of explanations were offered for this. 75% of technicians were found to have pursued evening or day release study. Reference was made to "an impression that there is still a cheap manpower approach to medical laboratory technicians" and " a reluctance to permit them time off for study".

The report included a table showing that for technicians, the predominant sources of guidance into the career were Youth Employment Officers, schools, family and friends. One notable conclusion in the report questioned the justification for appenticeship of technicians and suggested that all young people should be treated as full time students during training.

The general impression conveyed by this report is that the reforms in the education and training provisions which were to occur in the years immediately following its publication were most timely.

1968 saw the publication of The Report on Hospital Scientific and Technical Services prepared under the chairmanship of Sir Solly Zuckerman. This report noted an increase of more than 100% (2,942 to 6,922) in the number of technicians in post in the N.H.S. between 1957 and 1962. It also referred to a subsequent increase of almost 40% by 1967.

During the years between 1958 and 1966, the annual increase in requests for pathological investigations was seen to have doubled, increasing at a rate of 10% annually. It was observed that the introduction of automated techniques of analysis had led to a dramatic increase in technician productivity and that the proportion of women in technician posts had doubled between 1950 and 1966.

The main proposal which emerged from the report was that existing classes of technical and scientific staff should be integrated into a new structure and in its summary of recommendations it advocated the reclassification of technical grades into broad functional divisions with opportunity for advancement and promotion to the higher classes according to qualification, experience and ability.

In 1972 the D.H.S.S. commissioned an examination of the management training and developmental requirements of technicians employed in N.H.S. pathology laboratories. This task was undertaken by Warlow D. who submitted his Final Report in 1974.

The report placed emphasis upon the rapidity of change which was occurring in the function, activities and role of pathology laboratories.

Referring to technician training, Warlow suggested that the National Certificate system frequently showed a lack of co-ordination between theoretical training at college and practical training within the laboratory.He noted that there appeared to be a dichotomy between the two separate worlds of college and laboratory and that any correlation of the two usually occurred by chance. Warlow proposed that this break between theory and practice was aggravated by inadequacies of laboratory training arrangements and of college liaison. The report included among its recommendations criteria for the effective control and direction of technician recruitment, education and laboratory training.

In August 1973, McCallum R. prepared a paper which, with particular reference to the Principality, examined Scientific and Technical Training within the N.H.S. and the implications upon it of the reorganisation of the service which was to occur in 1974.

He also recognised the vast expansion of the paramedical services which took place during the 1960's and early 1970' and referred to the manner in which provisions for different occupational groups had developed in an ad hoc way, creating role conflicts, communication problems and excessive demands upon educational and training resources.

The main recommendations which McCallum made were that education provision available outside the laboratory service should be retained and that more effective training schemes should be developed within the service.

The other category of previous research relevant to the present study includes several investigations which focussed on more specific issues and were more limited in their scope.

In November 1968, Clarke J. undertook, upon the direction of the Committee of the Cardiff Branch of the I.M.L.T., a survey of the Professional Attitudes and Needs of a Group of Young Medical Laboratory Technicians. The main aims of this survey was to explore student technician views of the professional organisation and to determine ways of effectively providing student technicians with advice and guidance relating to their careers.

The report published as a summary of the findings of this survey concluded that there was an urgent need to provide younger medical laboratory technicians with systematic and authoritative information and advice on all aspects of their careers with particular emphasis upon the role and function of the I.M.L.T.. It recommended that this should be provided as a formalised component of college courses.

As part of a study of medical laboratory management, Kerr E.J.C. 1973 completed his study project on In-Service Training for medical laboratories. The project considered the needs for the development of in-service training programmes and described a model programme suitable for junior technicians in a microbiology department and which would complement National Certificate studies pursued in college courses.

Kerr divided training into three sectors; educational courses, formal training within the laboratory and on-job training within the laboratory. He discussed the objectives of these components of the total training process and considered the merits of various ways in which they might be implemented.He suggested that changing demands upon the pathology service and structural changes in the N.H.S. would probably lead to a change in the role of the medical laboratory technician. He also asserted that improvement in the academic training of technicians through the introduction of National Certificate courses should be matched by comprehensive training in the work situation.

The survey carried out by Allison R.T. 1974 was designed as a re-examination of one of the groups of Professional and Technical Staff in the Hospital Service in Wales, which had been the subject of the survey by Crichton and Crawford some eleven years earlier in 1963.

Allison's survey shows certain similarity in design and objectives to the present survey: it also exhibits several fundamental differences.

He set out to examine the attitudes of technicians which related to their occupation, the effects of hospital re-organisation and the effects of the recommendations made by Crichton and Crawford in 1963. The survey was undertaken by means of a questionnaire, the subject population being medical laboratory technicians employed in hospital laboratories within the Cardiff area, irrespective of age, qualification or grading.

In addition to descriptive study of the main characteristics of his subject population, Allison applied explanatory analysis to the responses of his subjects which related to the effects of hospital re-organisation and of the recommendations of "The Critchton Report". Certain of his findings are employed for comparative purposes in the analysis of the findings of the present survey.

In 1974 McMaster R.S., completed an unpublished investigation of " The Role of the Laboratory Training Officer and the Integration of His Duties into the Existing Management Structure" (of laboratories). In it he proposes that the Laboratory Training Officer should contribute to recruitment arrangements by pursuing active liaison with schools and colleges, and he recommends a procedure for the interviewing of recruits. McMaster describes the main responsibilities of the Training Officer as that of assessing the training needs of the department, assessing the training needs of the individual, providing an effective training programme and a comprehensive means of assessing its effectiveness. Liaison with F.E. establishments within which technicians were pursuing academic study was also referred to as an important function of the Laboratory Training Officer.

McMaster concludes that the establishment of the post of Laboratory

Training Officer led to a measurable improvement in the quality and quantity of training which junior staff received and that this allowed standards of morale and quality control to be maintained in the face of a demand for increasing productivity..

The extent, appropriateness and effectiveness of training and education for medical laboratory technicians was the subject of an investigative project undertaken by Garner S.E. in 1976. The area of enquiry of this work showed similarities to that of the present survey, the objectives being defined as:

(a) to determine how much effort is put into in-service training.

(b) to determine the degree of satisfaction felt by both junior and senior laboratory staff with respect to the training received and provided.

(c) to determine how colleges and laboratories see their respective roles in the training of medical laboratory scientists.

(d) to determine if college staff are satisfied with the courses they teach.

(e) to determine if college staff are satisfied with the facilities available at their colleges for the training of medical laboratory scientists.

(f) to determine the optimum number of students in O.N.C. and H.N.C. classes.

(g) to determine the involvement of laboratory staff in specialist subject teaching at the colleges.

The method of investigation which Garner employed was however substantially different from that used in the present survey. Garner collected information from college teaching staff and from the senior staff of medical laboratories by means of separate postal questionnaires which comprised almost entirely of closed questions.

By analysis of the responses obtained from fourteen laboratories and fifteen colleges, Garner concluded that employing laboratories and colleges providing courses of study for junior laboratory staff were agreed upon their respective roles in medical laboratory technician training. He reported significant dissatisfaction with the Medical Laboratory Science syllabus and general satisfaction with the content of specialist subject syllabuses and with the suitability of lecturers. He also suggested that laboratories appeared to make great efforts to provide adequate in-service training. Garner's findings were thought to indicate a general opinion that the National Certificate system of education and qualification produces technicians with a higher academic ability than did the former I.M.L.T. Intermediate and Final system. The technical competance of staff trained by the O.N.C. and H.N.C. pathway was however thought to be poorer.

Within colleges there was apparent satisfaction with the content of courses and the National Certificate pathway was considered to suit present-day requirements.

It is notable that the information and opinions upon which these conclusions were based was obtained from "providers" (teachers and trainers) rather than from recipients (junior technicians) and it is interesting to speculate whether the latter would express similar views. The present survey may well shed some light upon this question. Garner's investigation was limited to the consideration of training involving only part time college study by O.N.C. and H.N.C. courses and no reference was made to equivalent O.N.D. and H.N.D. sandwich courses or to training leading to Special Examination for Fellowship of the I.M.L.T..

In spite of the different perspectives which these investigators have adopted, there is significant similarity in their observations and recommendations upon several issues which are relevant to the present study.

Almost all refer specifically to rapidly increasing and changing demands upon the laboratory service and to the effects which such changes are likely to have upon the functions, activities and roles of medical laboratory technicians.

They appear to be largely in agreement that for these reasons, changes in arangements for education and training were desirable and should provide for academic study outside the Health Service, matched by improved arrangements for training within the Service.

While the National Certificate system is accepted as an appropriate academic component and colleges and laboratories recognise their respective roles, there is an awareness that a bicentric system of education and training creates problems of co-ordination and these do not appear to be entirely resolved.

More than one of the investigators reported concern which was felt over the maintainance of standards and technical competance and see the establishment of more effective laboratory training as a necessary measure.

These are issues upon which the present investigation may shed some light. Where this is the case, the findings of these investigators could provide a profitable element of general comparison as well as more precise correlation where the date obtained closely parallels that which is available.

Section 2. Background to the Present Arrangements and Provisions.

Needs

The primary purpose of the changes in the education and training of medical laboratory technicians, which occurred or were proposed during the fifteen years between 1962 and 1977, was undoubtedly to ensure that the technician workforce of the hospital laboratory service was equipped with the knowledge and skills necessary to function effectively in an area of scientific investigation that was expanding and evolving at an increasingly rapid rate. It was recognised that the existing provisions for technician education and training would fall seriously short of this objective for a number of reasons.

Scientific and technical innovation was proceeding at an unprecidented pace bringing entirely new techniques, methodologies and instrumentation into the routine activities of laboratories. Entire bodies of knowledge and practice were being replaced by novel principles and unfamiliar procedures.

Examples of these changes are legion.

Visual cell counting techniques were giving way to electronic methods: radioisotopes were being employed in elegant labelling and tracing techniques to investigate biochemical and physiological mechanisms: the study of cellular chemistry was superseding areas of traditional histology: enzymology was developing as an intricate web of investigation: bacteria were being identified by elaborate biochemical techniques: immunology and immunochemistry were advancing rapidly in a variety of diagnostic directions.

Manual methods for the determination of constituents of body fluids were giving way to automated methods and computers were acquiring an important role in the manipulation of laboratory data. Improved levels of precision and accuracy were being constantly sought and the constituents of pathological material were being identified and determined more specifically and in smaller and smaller amounts. Such developments were accompanied by the introduction of a wide range of instrumentation procedures previously rare or unknown in medical laboratories and gas-liquid and thin-layer chromatography, immunoelectrophoresis, beta and gamma particle counting, reaction-rate analysis, immunofluorescence and spectrofluorescence, specific-ion detection, ultracentrifugation and multichannel automated analysis exemplify the techniques that were becoming commonplace. There was no evidence to suggest that innovations of this sort would cease in the foreseeable future.

In the face of such circumstances, it seemed clear that if technicians were to continue to fulfil their role, the loosely regulated arrangements by which their training had been pursued in the past would need to be replaced by programmes which would ensure adequate and effective training in the practice of up-to-date techniques and procedures.

At the same time, the circumscribed courses of vocational education would need to be extended in order to provide a sound, broad base of scientific study so that existing techniques and procedures could be practiced with knowledge and skill and new ones could be easily and rapidly assimilated.

Five organisations were directly and substantially concerned with the practice of medical laboratory technology and the provision and the regulation of technician education and training.

As the major employer of medical laboratory technicians, the D.H.S.S. was responsible for the provision and maintainance of a technician workforce which met the needs of the service. In this respect, it had an obligation to provide the resources and facilities necessary for in-service training and also to ensure that this training was supported by appropriate and adequate vocational education .

The M.L.T.B. of the C.P.S.M., in addition to maintaining a register of technicians who were qualified to practice, had a statutory responsibility for the consideration and approval of courses of training and education, of qualifications and of institutions which provided training.

Competance to practice and the interests of the patient were the overriding priorities of this organisation and although educational requirements were taken into account, they remained secondary priorities.

The I.M.L.T., as the professional organisation of medical laboratory technicians, placed the interests of its members as its first priority and to these ends was concerned with promoting up-to-date practice, high standards of professional conduct and competance and also with the advancement of knowledge of practitioners by the establishment of examinations and the conferring of awards.

The F.E. service of the D.E.S., already committed to the provision of vocationally orientated courses of study in many fields of science and technology, had for some years accepted responsibility for supporting courses based upon the Intermediate and Final Examination syllabuses of the I.M.L.T.. Any change or extension of this responsibility would inevitably require its cooperation and participation.

The R.C.P., representing pathologists with administrative responsibility for Health Service pathology departments, had an obligation to advise the D.H.S.S. of the staffing requirements of laboratories and for some years had also played a part in the qualifying examinations for medical laboratory technicians by collaboration with the I.M.L.T.. It could therefore be expected to have an interest in, and contribute to, any new developments in educational and training arrangements for technicians.

As well as meeting the occupational needs that had been recognised and identified, any new arrangements would have to be practicable in operational terms and would also need to be compatable with the various interests and policies of the organisations that would be directly concerned. Above all, the new provisions for education and training would have to be economically viable.

The importance of both main components of the overall training process - practical laboratory training and supportive scientific studies - was indisputable in view of the very practical and applied nature of the occupation and of the scientific complexity of the techniques and procedures employed.

Effective integration of these two components was seen to be crucial if technicians were to develop and apply practical skills with knowledge, understanding and competance.

Training

In view of the highly specialised facilities and materials necessary to provide technicians with adequate practical training and experience, medical laboratories were believed to be the only location in which this component of the overall training programme could be effectively undertaken.

Two possible alternatives might have been considered.

Training laboratories providing a simulated on- job situation could have been developed as schools of medical laboratory technology either attached to hospitals or medical schools or within colleges in the F.E. service.

Both these propositions would have been rejected not only because of the enormous expense which would have been necessary, but also because it was held that training in a simulated situation would fail to convey the heavy responsibility and important protocols implicit in investigations concerned with the treatment of patients. It was also held that realistic operational conditions could not be simulated outside the practising medical laboratory.

Laboratory training of technicians would therefore continue to be the responsibility of each and every laboratory where, in the interests of the public, the employer and the profession, training which would provide the highest standards of competance and expertise, should be actively pursued.

While in previous years, the I.M.L.T. had bourne the responsibility for promoting and monitoring standards of laboratory training, the creation in 1960 of the M.L.T.B. of the C.P.S.M. provided a new instrument possessing statutory powers relating to the maintainance of standards of laboratory training and practice. In due course, this body was, with the cooperation of the I.M.L.T., to introduce a programme of visits to laboratories in order to assess the adequacy of training provision and where necessary, to give advice on how this might be improved.

Eventually, recommendations concerning the content, operation and management of laboratory-based training programmes were agreed and were published by the organisations directly concerned. These would presumably form a basis upon which laboratory training programmes would in future be judged, and advice given.

Vocational Education

If technicians were to apply existing and new techniques of laboratory investigation with knowledge and understanding, it seemed clear, and was generally accepted that substantial revision and extension of the existing provision for vocational education was no less important than the proposed improvements in laboratory training.

A variety of options appeared to be open, again predominantly based upon a choice of either the development of schools of medical laboratory technology attached to hospitals or medical schools and providing academic courses in addition to practical training, or continued but extended reliance upon the F.E. service for the provision of the necessary academic courses. It was also conceivable that the precise requirements for academic courses could be affected by changes that might occur in entry qualifications and recruitment polices. Even if these were to be changed significantly, and in whatever way, there would however remain a need for courses of some sort, designed specifically for medical laboratory technicians. Although fully integrated courses, in which laboratory training and academic studies were located in the same institutions, would have been attractive by virtue of the control and coordination which this would permit, in economic terms the siting of academic studies in schools of medical laboratory technology attached to hospitals or medical schools would have been even less supportable than the development of such schools solely for the purpose of laboratory training.

The F.E. service,on the other hand, was prepared,in the spirit of the 1961 White Paper "Better Opportunities in Further Education", to undertake the provision of revised and extended academic courses and the nucleus for such provision already existed in the established courses leading to Intermediate and Final Examinations of the I.M.L.T.

In recognising the changing needs relating to technician education and training, it appeared evident that while the immediate objective should be to improve provision for a recruit population with the G.C.E. O Level entry qualifications which were prevalent at the time, recruitment of technicians with more advanced entry qualifications would be beneficial to the service and to the profession.

While it was probably neither desirable nor practicable to impose a sudden change in the minimal entry qualifications, it was likely that the revised educational and training arrangements would lead to improved career prospects and these in turn might well attract increasing numbers of recruits with better qualifications. Such recruits, whatever their entry qualifications might be , would still require systematic laboratory training and academic studies appropriate to the occupation and to their previous qualifications. It was therefore necessary to develop arrangements for academic study and qualification which would be suited to a technician population with entry qualifications which were predominant at the time but into which recruits with more advanced entry qualifications could easily and appropriately be accomodated.

Courses of study in institutions providing tertiary education are usually arranged in one of four major operational modes.

Some consist of full time study after which students may qualify for entry to a variety of occupations. In certain of these, periods of appropriate training following academic studies qualify students for entry into specific occupations. Such courses are common in the H.E. sector but less so in F.E. where a degree of concurrency of education and training is commonly considered essential. This is usually accomplished by either a day release arrangement in which students are already in full time employment and are released to college studies one day in each week of the academic year, or by a block release arrangement in which students are released from employment for block periods of several weeks duration, or by a sandwich course arrangement in which students spend alternating periods of several months undertaking training in employing institutions and in college studies.

Day release and block release courses invariably cater for students who are already in full time employment. Sandwich courses on the other hand may be either college based - where students recruited to the course are supported by L.E.A. discretionary awards and only seek full time employment upon qualification - or industry based - where students are recruited as full time employees and seconded to college courses as salaried trainees.

Well-established courses operating along these lines already existed in the F.E. sector for other disciplines, notably Engineering, Chemistry and Applied Biology, and appeared to be appropriate to technicians occupations where the integration of academic studies with on-job training was considered to be important. These were the National Certificate and Diploma schemes and they possessed a number of features which made them attractive to the organisations concerned with educational provisions for medical laboratory technicians and also appropriate and practicable for this purpose.

National Certificate and Diploma schemes were regulated and controlled at national level by Joint Committees which included representatives of the D.E.S., employing authorities, professional organisations and other interested bodies. Thus the development of similar arrangements for medical laboratory technicians would allow the D.H.S.S., the D.E.S., the I.M.L.T., the M.L.T.B. of the C.P.S.M. and the R.C.P., by representation on the Joint Committee, to play a part in the developments and pursue their respective policies and interests.

The content of syllabuses in terms of their relevance to occupational needs, academic standards and the balance and depth of treatment of subject areas could be controlled: the schemes would also allow students wider educational needs to be properly taken into account.

Operational arrangements for courses and also the adequacy of available educational resources and facilities would all be subject to the approval of the Joint Committee.

A further advantage of adopting a National Certificate and Diploma structure would be that many F.E. colleges already had considerable experience of operating such courses and the transition from the existing I.M.L.T. Intermediate day release courses and Final evening courses would thus be less difficult to accomplish.

The two-tier structure of Ordinary and Higher awards in the National Certificate and Diploma schemes would also permit the process of transition to be phased, so minimising the numbers of students whose studies would be disturbed and allowing more time for the planning and development of arrangements for the Higher awards.

National Certicicate and Diploma schemes also offered an operational flexibility which would be especially valuable at a local level. Courses could be arranged in a manner appropriate to the staffing circumstances within laboratories, would allow senior medical laboratory technicians to participate as part-time teachers and would be be compatable with variations in recruitment and employment policies between different employing laboratories.

From an educational standpoint, the notable merits of the schemes were that they would provide prospective technicians with a choice of entry level - Ordinary or Higher - according to their entry qualifications and a choice of course type - day release, block release or sandwich - according to their preferences or job opportunuties. National Certificate and Diploma schemes were already recognised nationally, were understood by employers and were accepted as appropriate entry qualifications to a variety of more advanced professional and academic courses.

Recruits with G.C.E. 'O' Level and those with G.C.E. 'A' Level qualifications would be able to step on to the qualifying ladder at a point appropriate to their entry qualifications. For students who entered employment directly following their secondary education there would be opportunity for part time study by day release or block release Certificate courses. For those who wished to pursue studies and training before entering full time employment, Diploma courses in a sandwich form could be made available.

(a). Content and Structure of National Certificate and Diploma Schemes.

The schemes attempted to meet the broad spectrum of student educational needs by identifying three main areas of study:

(i). Basic and Supportive Sciences.

At O.N.C. and O.N.D. levels the basic science needs were to be provided by study of Mathematics, Physics, Chemistry and Biology beyond G.C.E. 'O' Level and with emphasis on the areas within these subjects which were most directly relevant to the specialised studies within the schemes.

Physical and Organic Chemistry, Applied Biochemistry, Cell Biology and Molecular Biology were seen to constitute the main basic and supportive science subjects at the more advanced H.N.C. and H.N.D. levels. The relevant areas of these subjects were integrated to form a composite subject referred to as Medical Laboratory Science. Additionally, studies in Mathematics, Physical Science and Biological Science were included in H.N.D. programmes to make good any deficiencies which would otherwise result when students entered the course with only the minimum one 'A' Level qualification.

(ii). Specialised Studies.

The specialised technical subjects which had previously constituted the I.M.L.T. Intermediate and Final Diploma syllabuses were incorporated into National Certificate and Diploma syllabuses at

Ordinary and at Higher levels as elective or optional subjects. Within O.N.C. and O.N.D. these studies were to be pursued as the multidisciplinary subject, Medical Laboratory Sciences. In this, the chemical and biological basis of medical laboratory technology received greater emphasis and the practical techniques which formed the larger part of the I.M.L.T. Intermediate syllabus received rather less direct attention.

At the Higher level, the specialised subjects of the I.M.L.T. Final syllabuses were redefined as four optional subjects which corresponded with the main disciplines in medical laboratory technology, namely Clinical Chemistry, Haematology and Serology, Histopathology and Cytology and Medical Microbiology. Adjustments in the theoretical and practical content took account of the studies which would be undertaken in the subject Medical Laboratory Science.

(iii).General Studies.

The inclusion of this subject within the National Certificate and Diploma schemes gave recognition to students broader and less specifically vocational educational needs and was intended to reflect their growing personal and technical maturity while continuing to promote a critical approach and consolidate their powers of reasoning and independant thought.

The subject was also seen as a means of developing students communicative abilities and their understanding of their social and occupational environment.

(iv). Operational Arrangements.

It was recommended that approximately 60% of the total study time should be devoted to Basic and Supportive Sciences, 30% to Specialist Option Subjects or Elective Subjects and 10% to General Studies.

In the Notes for Guidance published by the Joint Committees, special stress was laid upon certain operational arrangements which were considered to be of paramount importance, particularly at the Higher and Registrable level of H.N.C. and H.N.D..

Basic and Supportive Science studies were to be presented as an interrelated association of biological and physical sciences with special reference to the application of these subjects in contemporary laboratory medicine.

At least half of the study time prescribed for Medical Laboratory Science and for Specialist Option or Elective subjects should be devoted to practical work illustrating scientific principles, the basis of contemporary techniques and technical applications.

Practical work in the form of experimental projects was to be encouraged. The application of mathematical and statistical principles in all aspects of the studies was advocated and a continuing theme of quantitative measurement and its applications was recommended as a means of avoiding fragmentation of the courses into isolated and unconnected units of study.

Guide syllabuses were designed in a form which encouraged a team-teaching approach and great emphasis was given to the importance of coordination and integration of the various subject areas.

Equally strong emphasis was placed upon the value of co-ordination of college studies with laboratory training and the success of courses was seen to depend very much upon active co-operation between colleges and employing laboratories where training was carried out. It was recognised that the use of medical laboratories for the teaching of the more specialised and practical aspects of the Specialised Option subjects could be advantageous and that experienced staff of medical laboratories would be valuable contributors to courses in the capacity of specialist lecturers.

Colleges responded promptly and enthusiasically to the proposals for

Ordinary and Higher National Certificates and Diplomas in Medical Laboratory Subjects and courses were developed in block release and day release modes, the choice depending largely upon the preferences of employers in particular localities. .

It appeared that most found day release more compatible with staffing circumstances within laboratories for the majority of colleges developed courses in this mode. The minority of colleges which introduced courses in a block release mode tended to be those which served a large geographical area over which hospital laboratories were widely dispersed and where attendance of a day release course would be precluded by the distances which many students would be required to travel.

Other considerations probably contributed to the predominant development of courses in a day release mode. In operational terms, colleges probably found a day release arrangement provided a more even commitment of resources over the academic year. The employment of practicing medical laboratory technicians in the capacity of part time lecturers and the use of hospital laboratories for the teaching of specialised subjects would also be more practicable in a day release arrangement: such teaching could be conducted during evening periods when staff and facilities were not committed to the normal work of the laboratory.

The features in day release courses of regular weekly college study alternating with work experience throughout the course may also have been thought to be preferable to the intensive study periods, separated by long periods of work experience, which characterises block release courses. It is thought by some that the former has the advantage of maintaining student interest and effort at a steady and tolerable level and also permits continuous association of college study and laboratory experience and training.

The predominance of the day release mode for O.N.C. and H.N.C. courses is evident in the annual listings of courses available in England and Wales. During the period under discussion day release courses appear to be at least three times as common as block release courses.

Although the recommendations relating to the structure and content of Diploma courses were published by the Joint Committees alongside those for Certificate courses, they have remained minority routes to qualification in medical laboratory technology. Diploma courses at the Ordinary level have been introduced by less than ten colleges while H.N.D. courses have been developed at only three colleges and these have only been permitted on an experimental basis.

Diploma courses differ substantially from Certificate courses in a number of important respects.

Unlike the work-based Certificate courses, they are college-based students being recruited from school either directly by the college or through a sponsoring employer.

Diploma courses are arranged in a sandwich mode with long periods of college study and either alternating or end-on periods of training in hospital laboratory placements.

The total time of college study is very much greater for Diploma students than for those following Certificate courses and thus allows more time for the study of essentially the same subjects as those prescibed for Certificate course.

In one sense this might be seen to balance out the quantitatively greater and less artificial work experience which Certificate students receive as compared with that received by Diploma students. It may be that as a consequence of this, Diploma students emerge with a more academic approach to the occupation while Certificate students retain a more practical and applied view.

(b).I.M.L.T. Fellowship Qualification.

The introduction of National Certificate and Diploma schemes, along with more precisely defined requirements for laboratory training, were expected to provide for the effective education and training of technicians up to the level of Statutory Registration. These developments served to focus attention upon the needs for similar provision beyond that stage, towards the highest professional qualification and one that was necessary for technicians to proceed to senior appointments.

Prior to 1965 Fellowship of the I.M.L.T. was attained by advanced study in two specialist disciplines, which could be pursued without necessarily attending an organised course of study.

Because of the anomalous situation that would occur if this arrangement was continued when H.N.C. and H.N.D. became the normal route of entry to Fellowship study, and also because of the greatly expanded bodies of knowledge and practice which were evolving in the respective specialised disciplines,the "double Diploma" route to Fellowship was replaced in 1965 by the Advanced Examination for Fellowship. In 1967 this was renamed the Special Examination for Fellowship.

The essential difference which this change brought about was that studies at this level would henceforth be devoted to the same single specialised subject which students had studied in H.N.C. or H.N.D. courses.

As well as rationalising the relationship of the Fellowship qualification to that of preceeding H.N.C. and H.N.D. qualifications, this change posed new questions affecting wider issues.

The importance of relevant supportive science studies to the specialised applied subjects within H.N.C. and H.N.D. courses had been a major consideration in their design. It might be argued that the more specialised and advanced applied subjects studied at Fellowship level justified at least to some extent, similar parallel studies of supportive science.

If this were to be the case, fundamental changes in the arrangements for study and for examination might become necessary. Additional time would need to be provided for the study of supportive sciences, for any contraction of study time devoted to the specialised subject would be unacceptable in a qualification as vocationally specialised as the Fellowship of the I.M.L.T..

Substantial release from employment would be necessary if students were to attend extended courses and an additional resource liability would be created for the F.E. service.

If the study of supportive science were to become an essential component of the qualification,it would be reasonable to expect that students should be examined in this subject as well as in the specialised subject. This would place upon the I.M.L.T., in its capacity as the exclusive examining body for Fellowship, an added financial and operational burden. In such a situation, the I.M.L.T. might be compelled to relinquish its total control of the qualification to a body similar to the Joint Committees which had been set up to regulate National Certificates and Diplomas.

A change of this nature could prove to have a very serious effect upon the recruitment and retention of I.M.L.T. members.

The replacement of I.M.L.T. Intermediate and Associateship examinations by those administered by the Joint Committees for Ordinary and Higher National Certificates and Diplomas had removed the necessity for students to obtain I.M.L.T. membership prior to their entry to these examinations. This had already been seen to lead to a striking decrease in the numbers of technicians who sought to become Student Members and Ordinary Members of the I.M.L.T..

A similar loss of compulsion to obtain I.M.L.T. Associate Membership prior to entry to Fellowship examination, and to retain membership as a Fellow after gaining the award could lead to further loss of I.M.L.T. members and a consequently weakened professional body.

In the face of these uncertainties, efforts to obtain improved arrangements for Fellowship study were pursued with care and caution. While showing a very clear determination to retain control of the most advanced professional qualification, the I.M.L.T. exerted pressure upon employing authorities to fully implement the recommendations of H.M.(62)16 so that technicians preparing for Fellowship qualification might attend day release or block release courses during working hours without loss of pay.

Revised study guides were prepared and because at that time attendance of an approved course was not an obligatory condition of entry to the examination, they were directed towards students and their employers as well as towards colleges which offered courses leading to Fellowship Examination.

The study guides specified the main areas which should be studied in each of the six specialised subjects and indicated that a very thorough and extensive knowledge and understanding of the subject was required.

Additionally, candidates were expected to have studied relevant supportive science subjects to a level beyond that expected at H.N.C. and H.N.D.. It was pointed out that college courses could not be expected to cover all the topics of the specialised subjects in the necessary depth and detail and emphasis was made of the importance of private study and participation in discussion groups and scientific meetings.

Unlike National Certificate and Diploma Examinations which were internally set and based upon the teaching programmes of college courses, Fellowship Examinations were entirely external and college courses could not therefore be expected or assumed to provide all the knowledge and understanding necessary for this examination.

The Fellowship courses, developed at a limited number of colleges, were therefore designed to supplement the experience which students acquired in their employment and the study which they pursued in their own time. The courses did not purport to cover the examination syllabus comprehensively, but did provide expert tuition in the major topic as well as the guidance and direction necessary for effective study.

This approach appeared to be appropriate for a course leading to an examination demanding the depth and width of knowledge necessary for Fellowship qualification. It was also compatible with the limited study leave permitted under the terms of D.H.S.S. S.T.M.47/70 concerning post-registration students.

Technicians at the post-registration stage were, by virtue of their laboratory experience, assumed to have a high degree of technical skill and expertise. For this reason the Fellowship examination did not, unlike the previous I.M.L.T. Final Diploma qualifications, include a practical component. Courses therefore comprised wholly of theoretical study accomplished by formal lectures, seminars and tutorials.

The up-to-date quality and the level of knowledge reqiired of students seeking Fellowship qualification was such that colleges were expected to find it essential to recruit as visiting lecturers, practising scientists with current expert knowledge and experience of specialised areas of medical laboratory technology. This was seen to be an indispensable adjunct to the teaching carried out by full time college staff.

The arrangements for courses leading to I.M.L.T. Fellowship examination were thus developed as a natural continuation of study following H.N.C. or H.N.D. qualification and were at the same time compatible with the limited study leave permitted by employing authorities. The discretionary nature of the D.H.S.S. reccomendations relating to study leave meant that some local employers could still require students to prepare for Fellowship examination entirely in their own time. For this reason, completion of an approved course had not become a mandatory condition of entry to the examination up to the time when this investigation was conducted.

The I.M.L.T. retained complete control of the award and in this way could expect to be assured of the membership of all technicians pursuing and holding Fellowship examination as a post-registration qualification.

The Institute of Medical Laboratory Technology

The transition from the Intermediate and Final examinations, controlled exclusively by the I.M.L.T.,to National Certificate and Diploma qualifications administered by the Joint Committees, has already been shown to have removed technicians obligation to obtain membership of the professional body until one year prior to entry to Fellowship examination.

After 1963 State Registration requiring appropriate experience in an approved laboratory, together with acceptable academic qualifications, could be obtained quite independantly of I.M.L.T. membership. Thus technicians who did not aspire to Fellowship qualification - still necessary for senior appointments within Health Service laboratories - would never be obliged to obtain membership.

The consequences of these changes are apparent in the records of I.M.L.T. membership in the respective classes which was published in 1975. They show a steady and continuous increase in the number of all classes of membership from immediately after the Second World War until 1966 - 68, when the National Certificate and Diploma schemes became fully operational.

After that period until the present time, numbers of members in the classes of Associate and Fellow continued to increase at a similar rate while numbers in the classes of Student Member and Ordinary Member showed a steep and continuous decline. If this latter trend continues at the same rate it seems likely that these two classes of membership will cease to exist in significant numbers by the end of the present decade (Fig.6.1. page 160).

It seems certain that the I.M.L.T. would have anticipated this change in its membership pattern as well as other problems, when it relinquished the Intermediate and Final examination structure. Presumably it was resolved that the merits of adopting the National Certificate and Diploma schemes outweighed the possible disadvantage of reduced numbers within the lower classes of membership. When the decrease in recruitment into these membership classes became apparent, it caused considerable anxiety within the profession, particularly at local Branch level.

In October 1969 the Cardiff Branch of the I.M.L.T. commissioned a survey " of the professional attitudes and needs of a group of young medical laboratory technicians" which might be served by the Branch organisation (Clarke J.W. 1970).

In February 1974 a conference of Branch Chairmen discussed the difficulty of persuading new members of laboratory staffs to join the professional body promptly. A variety of reasons were put forward to explain this tendancy.

The Cardiff study was considered to indicate "an urgent need to ensure that younger medical laboratory technicians are provided with systematic and authoritative information and advice on all aspects of their career ...... the changes which have taken place in recent years and are still occurring, particularly in the educational and the qualifying spheres, make such arrangements essential." The report of this study also recommended that college courses should be used as a vehicle for such guidance and also to encourage recent recruits to professional participation.

At a Conference of Local Chairmen (Gazette of the I.M.L.T. April 1974 page 133), some attributed the decline in junior membership of the I.M.L.T. to lack of encouragement and even active discouragement from senior members of the profession. It was suggested that it was their inability to influence I.M.L.T. policy that deterred young technicians from seeking membership and that the lack of material gain in return for membership subscriptions was also a significant factor. A further observation at this Conference was that the I.M.L.T. should perhaps deliberately set out to become a post-Registration qualifying body with voting rights restricted to Associates and Fellows of the I.M.L.T.

Although the I.M.L.T. has not formally adopted such a policy, it would seem that circumstances are leading to a situation where the great majority of technicians acquire no formal professional affiliations until they are compelled to do so in order to qualify for entry to I.M.L.T. Fellowship examination.

This might be seen as an entirely acceptable trend if the career were to move towards a predominantly graduate entry pattern of recruitment.

It does however seem regrettable that if recruitment to the career at a lower level of qualification is to remain a significant feature, a large proportion of such recruits will not acquire formal professional affiliations in what are probably the most formative years of a technicians' career.

Entry Qualifications and Recruitment.

Prior to the changes which have been discussed, entry to the career was made by the great majority of recruit immediately after the award of G.C.E.'O' level qualifications. At that time, medical laboratory technology may have had only limited attraction for young people with higher qualifications - G.C.E. 'A' levels or university degrees. It is however apparent from regulations of the I.M.L.T. effective at that time, that recruits with such higher qualifications were not permitted exemptions which would allow them to attain professional qualifications in a shorter period than would have been necessary had they entered with only G.C.E. 'O' level qualifications. It was reasoned, perhaps rightly at that time, that higher academic qualifications could not merit exemption from early training and education that was predominantly of a technical and specialised nature.

Although the I.M.L.T. subsequently provided for some measure of exemption for holders of appropriate G.C.E. 'A' level passes and for science graduates (Regulations for Membership and Examination of the I.M.L.T. 1966), it was not until the transition to National Certificate and Diploma schemes had been effected and the Special Examination for Fellowship had been introduced, that recruits with higher academic entry qualifications ceased to be penalised.

Since then, full exemption from O.N.C. and O.N.D. has been permitted to those entering the profession with two appropriate G.C.E. 'A' level passes and exemption from H.N.C. and H.N.D. has been permitted to those holding a science degree of a British university.

Although the organisations primarily responsible for the direction and control of entry into and qualification within the profession are agreed that the minimum entry qualifications are and should remain at G.C.E. 'O' level or its equivalent, it is also generally agreed that the increasing complexity and diversity of the work carried out in medical laboratories justifies the development of a workforce with less stereotyped academic skills and experience than those offered by recruits entering with G.C.E. 'O' level qualifications: staff with more advanced academic qualifications are acceptable and desirable.

The recruitment pattern which might emerge from the implementation of policies based upon these views could be argued to have merit in several respects.

Recruitment of technicians with more advanced academic skills and experience might ensure that the needs created by increasingly complex scientific, technical, organisational and management activities within medical laboratories would be effectively met.

Staff entering the career with more advanced qualifications could be trained and could become fully qualified within a shorter period of time. Earlier qualification and the less time necessary for college study would be a significant economic advantage to the employer.

The profession itself might also be expected to benefit from the inclusion of more members with higher academic qualifications.

Its public status and the esteem it commanded from associated professions would be enhanced and would place techncians in a better position to play an effective and confident part in the control and practice within their profession.

For these reasons it seems unlikely that G.C.E. 'O' level will have remained the almost exclusive route of entry into the career.

A dramatic shift in the recruitment pattern to a wholly 'A' level or degree entry requirement would also seem to be improbable.

While there is certainly an increase in the complexity and diversity of activities in medical laboratories, there remains a substantial proportion of work which can be quite effectively accomplished by technicians recruited with G.C.E. 'O' level qualifications, and to which the skills of technicians with higher academic qualifications might be considered superfluous.

In spite of the apparent increase in the number of school leavers obtaining G.C.E.'A' levels and science degrees, it seems unlikely that there would be sufficient available for a sudden and total move to recruitment at either or both of these levels. Furthermore, such a change would probably be resisted by the profession as a potential threat to the position and status of members lacking these advanced qualifications.

Taking these considerations into account, it would seem that in the short and medium term, a progressive movement towards a mixed pattern of recruitment is the most likely consequence of the changing needs of the service coupled with revised arrangements for education, training and qualification.

This would certainly seem to be a desirable and practicable strategy. With regard to the changing needs of the laboratory service, it would provide staff with skills appropriate to present requirements. In the event of further substantial changes in the nature of the work involved - and there are indications that these will occur - a mixed recruitment policy will provide a valuable element of flexibility. It is also more compatable with a labour market which may be subject to fluctuations and would be less likely to create violent antagonism and upheaval in the profession itself.

Finally, the pursuit of a mixed recruitment policy would mean that opportunity to enter this occupation and aspire to the highest professional qualifications remained open to school leavers with varying academic qualifications and experience.

Allison (1974), in an unpublished survey, reported that 27% of the population which he studied held one or more G.C.E. 'A' level pass but he did not record the existence of any graduates within the surveyed population. This population was however composed of technacians of all ages and a proportion of these will undoubtedly have entered the profession and qualified prior to the changes which have

been discussed. The 27% reported as possessing G.C.E.'A' levels will therefore almost certainly be a deceptively low indication of the proportion of technicians who entered with 'A' level qualifications after the establishment of the new arrangements.
The absence of any reference to techncians holding degree qualifications suggests that prior to 1974, graduate entry did not constitute a recruitment level of significance.

It seems clear that the changes which were advocated, and in many respects have been implemented, are considerable in magnitude and extent.
Collectively they appear to impinge upon the entire structure of medical laboratory technician recruitment, education, training and qualification.
Many aspects of the new arrangements have become well-established and a period of relative, though probably trainsient stability has seemed to follow.
Certain important features stand out in a general overview of the subject area:

1. The changes which have been described constitute a massive and complex innovation with a central objective of ensuring that technicians are effectively equipped with the knowledge and skills appropriate and necessary to the present and future needs of the laboratory service.

2. Within the global innovation, several sub-innovations may be identified and related to the major characteristics of the occupation, namely: entry qualifications and recruitment policy; the content and arrangement of provision for vocational education; the content and arrangement of provision for laboratory training;

the machinery of professional qualification.

As a consequence of the close interrelationships of these occupational characteristics, the respective sub-innovations show distinct interdependancies which have been seen to have influenced their relative chronological positions.

3. The sub-innovations have involved a number of change agents operating at national, local and individual levels. Here again there is a complex structure and although predominant interests can be identified, the spheres of influence of most of these change agents encompass, directly or indirectly, the recruitment, education, training and qualification of technicians.

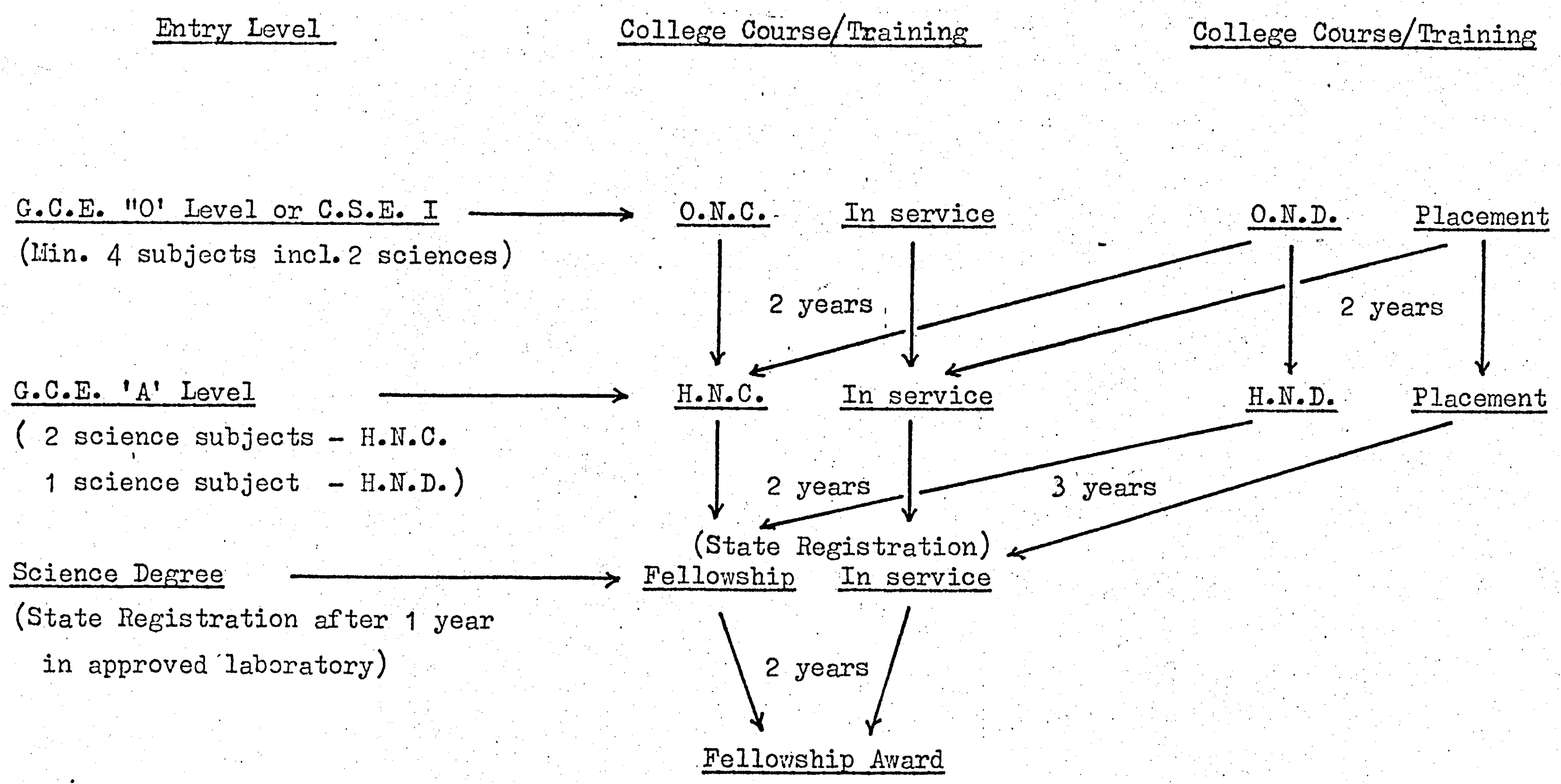
Fig.2.1. illustrates the major pathways by which the more important national and local agencies exercise influence and control upon these aspects of the occupation. Within these formal organisations, influences which are less easily identified and measured, may certainly be expected to come from a variety of individual agencies, particularly at local levels.

The primary national agencies - the D.H.S.S., D.E.S., I.M.L.T. and R.C.P. - exercise their influence by representation upon the M.L.T.B. or the Joint Committees or both. The policies of these last mentioned bodies are imposed directly by statutory or administrative powers upon colleges which make educational provision for technicians and upon laboratories in which technicians are employed and trained.

The responses of colleges and hospital laboratories will to some extent be subject to local circumstances and to the particular policies of local agencies. L.E.A. approval and support is necessary if a college is to provide courses of study and the operational details of courses will vary according to college practice.

Fig.2.1.

Levels of Career Entry, College Courses and Laboratory Training Arrangements for Medical laboratory Technicians Qualifications.



The rules of the Joint Committee are sufficiently broad to permit a degree of variation which such local circumstances impose upon the arrangement of college courses.

In a similar way, local circumstances are likely to affect arrangements made for laboratory training. The policies of A.H.A.'s relating to laboratory facilities and resources, workload, staffing structures and in-service training may influence the quality and amount of training that is provided by particular laboratories.

Individual agents, particularly those involved directly with the teaching in colleges and with the conduct of training in laboratories will probably influence as acutely as any other agency, the quality of the education and of the training which technicians receive in different colleges and laboratories. The attitudes which senior laboratory staff have towards their training responsibilities and also their instructional skills must certainly be important determinants of the quality of training provided.

The skills and experience of college lecturers will also be crucial factors relating to the effectiveness and relevance of college studies. Of special importance to an overall training process in which the relating of academic studies to laboratory training is seen to be vital, is the extent to which college staff place their teaching of supportive science in the context of contemporary laboratory medicine and conversely, the extent to which those concerned with laboratory training exploit the skills and the knowledge which students acquire in their college studies.

4. The total innovation will have had very considerable economic and organisational implications for the national and the local agencies involved. Release from employment for attendance of a block

release or day release course involves a reduction of at least 10% of the time which students normally spend in productive work within the laboratory. Such a deficit would be difficult to offset without increasing laboratory establishments.

An increase in the proportion of time which senior staff devote to technician training might also be expected to create a similar deficit of some significance. It is not difficult to imagine how such deficits resulting from the release of students for college study could mitigate against increased attention being devoted to laboratory training.

Provision of college courses in an extended and more elaborate form than previously will have created within colleges, new demands for specialised staff and physical resources of a complex and costly nature.

The validation, monitoring and certification of academic studies and of laboratory training under the new arrangements, will have required the establishment of formal administrative machinery operating at a national level. At a local level, formal machinery will have been needed to co-ordinate the development and the operation of college courses with the needs of employing authorities and with the training pursued within laboratories.

5. The primary target of the total innovation has been the student technician. Changes in their initial selection by the adjustment of entry regulations, the development of their knowlege and skills by the establishment of new and extended arrangements for college study and laboratory training, the laying down of new criteria for qualification and certification, have been the means by which the fundamental objectives of the innovation have been pursued.

It is notable that within the innovative process, only limited direct attention has been given to the wider cultural, intellectual and social interests of the students. This is a feature which is not uncommon in most sectors of Further Education where the central objectives are almost invariably concerned with specific occupational needs.

Elements of non-vocational study concerned with students wider needs are however mandatory components of all courses arranged within the National Certificate and Diploma structure, although there is no such component identifiable in current courses leading to Special Fellowship Examination of the I.M.L.T.

6. The innovation provides elements of choice and flexibility which are substantially greater than was available under the previous arrangements.

Levels of entry have been established for school leavers with G.C.E. 'O' level, G.C.E. 'A' level and with degree qualifications. They may be recruited into an occupational grade and enter training programmes and college courses at a level appropriate to their academic qualifications. No group is unduly disadvantaged and all may aspire to the highest professional qualification and position. School leavers have the additional choice of entering the career by direct appointment to a full time post with attendance of part time Ordinary or Higher National Certificate courses, or by pursuing Ordinary or Higher National Diploma courses and acquiring laboratory appointments upon qualification. Those in the latter category who successfully complete an O.N.D. course have the additional choice of seeking a laboratory appointment with attendant part time study in an H.N.C. course or of continuing as a full time student in an H.N.D. course.

Irrespective of their level of entry or mode of qualification and training, recruits would normally qualify as State Registered when they were 20 - 21 years old. Those wishing to pursue I.M.L.S. Fellowship qualification, necessary for senior appointments, would do so as employees in approved laboratories, attending preparative college courses operated on a block release or day release basis. Graduate entrants to the service, acquiring State Registration directly after one year's training and experience in an approved laboratory, would be able to pursue Fellowship qualification in a similar manner.

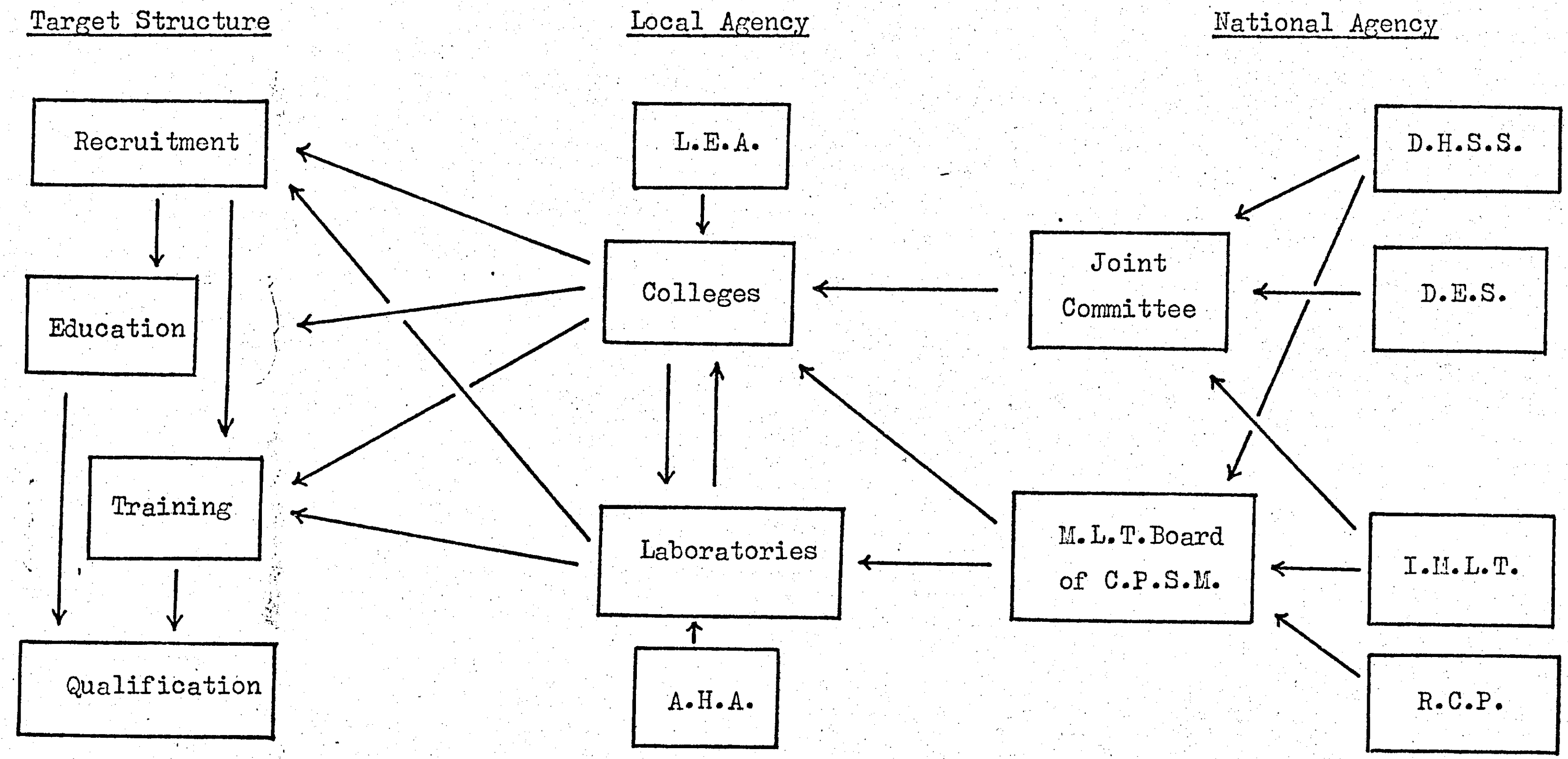
Fig.2.2. illustrates the the main features and interrelationships of the different routes to full qualification.

Although a considerable degree of choice of entry level and of qualification pathway has been said to reside with the student, in practice such choice probably rests to a large extent with employing authorities at a local level. While students with G.C.E. 'O' level or 'A' level or degree qualification may seek full-time appointments which they think to be attractive, it is the local-employer who makes the ultimate choice. Once a student has entered full time employment it is also the immediate employer who selects the student's mode of part time study, according to the availability of courses and operational constraints within the laboratory.

7\. Little published research appears to have been undertaken in the antecedent stage of the innovation. Work carried out during the interactive stage has already been referred to and although this yields some valuable insights into various aspects of the subject area, it offers only fragmentary views of the total innovation and these have been developed from a number of different perspectives and are not easily drawn together to provide a composite and coherent picture. The views provided by much of the

Fig. 2.2.

Pathways of Influence and Control of Medical Laboratory Technician Recruitment, Education, Training and Qualification.



of the previous research are also understandably limited by the incompleteness of the innovation process at the time of this investigation.

8. The entire innovation is characterised by choice and by change: choice for recruits and employers with regard to level of entry to the career, mode of academic study and the arrangement of laboratory training; change in the nature of the work carried out by medical laboratory technicians, in the content and arrangement of academic study and of laboratory training, in the criteria for qualification and in the roles and the responsibilities of organisations concerned with the regulation and control of the profession.

Chapter Two

Selection of an Appropriate Analytical Framework

The selection of an analytical framework which is appropriate to this investigation has constituted a serious problem.

Consideration of the question which has been posed as the central issue - "how can the the present arrangements and provisions for the education and training of medical laboratory technicians be made more effective?" - reveals certain features which must influence the choice of a suitable framework.

The question implies that the investigation is an attempt to determine ways in which an existing structure of education and training may be improved, rather than an exercise in the design of essentially new structures. Accordingly, it would seem appropriate to employ a study of the strengths and weaknesses of the present structures as a basis for the formulation of recommedations for improvement.

The generality of the question also imposes a need to identify and to delineate the factors which need to be studied so that important opportunities for improvement are not overlooked and that any recommendations made for improvement are valid.

It is recognised that enquiry into every factor upon which improvement might depend would be an enormous undertaking and is beyond the scope of this investigation. However, in the absence of substantial evidence of any gross defects in specific areas of the existing arrangements and provisions, which would otherwise provide obvious focii for enquiry, it would seem that the adoption of a broad-fronted approach would be most likely to permit the recognition of strengths and weaknesses, and thus opportunities for improvement in any major aspect of the educational and training processes.

The strictly curricular content of programmes of study and training will clearly be important determinants of their success and for this reason must receive attention in the investigation. However, syllabuses of academic study and of practical training for medical laboratory technicians, like those designed specifically for workers in many other occupations, are primarily utilitarian and are therefore probably less difficult to define and are less controversial than are those devised for non-vocational courses. Restriction of the investigation to the curriculum in its strictest sense of " what shall be taught?" would tend to provide a limited view, and it is felt that the question "how shall it be taught?" requires at least equal attention in order to take account of organisational and operational factors upon which the success of study and training programmes must substantially depend.

For these reasons, and particularly because of the elements of choice and variation which exist within the organisational and operational arrangement of study and training, it is believed that the manner and forms in which programmes of education and training are presented and pursued, the resources employed in their pursuit and the major characteristics of the students who pursue them, should receive particular attention in the investigation. At the same time, the chosen analytical framework must permit any notable defects of a strictly curricular nature to be recognised and facilitate the formulation of proposals for improvement.

Although the area of investigation lies within the domain of curriculum evaluation, existing models for such evaluation which have been examined, do not appear to be precisely appropriate to the present study. Certain of those discussed by Jenkins D. (1976) do however present perspectives which aid the development of a suitable framework for analysis.

In his Countenance Model, Robert Stake (1976) sees a need for formal and informal evaluation; both these approaches are felt to be appropriate to the present investigation. Stake also places emphasis upon the use of both descriptive and judgement data, and it is believed that data in both these forms will contribute to an understanding of where and how improvement may be made in the education and training of medical laboratory technicians. Stake also argues that the portrayal of an instructional programme by description may be at least as important as analysis and that in-depth analysis of precisely pre-specified characteristics may actually obscure or distort the true portrayal of a programme. These are views which underlie the approach to the present investigation.

The Countenance Model does however exhibit certain features which are thought to be less relevant to the present study.

At least four important primary sources of information may be identified for the purpose of enquiry into the education and training of medical laboratory technicians.

National agencies concerned with the employment, certification and the professional development of technicians might be canvassed for views or information. Standing as they do at a distance from the actual processes of education and training, their responses might be expected to relate to broad issues or policies rather than to detailed events and circumstances. Furthermore, owing to their varying responsibilities and interests, several of these agencies would need to be approached in order to obtain a balanced view of the subject area.

Information and opinion obtained from college teaching staff or from the senior staff of hospital laboratories - with their more direct involvement in education and training - would probably be more specific and detailed but might well be unbalanced or biased according to whether the respondants were predominantly concerned either with the sphere of academic study or with work and laboratory training. Data collected from these sources might also be unduly influenced by factors which would be be difficult to identify and control.

There is little doubt that data obtained from all these sources would contribute usefully to the identification of measures which would improve the effectiveness of the education and training of medical laboratory technicians.

The collection, analysis and interpretation of such data would however be a massive and complex undertaking which is beyond the scope and resources of the present investigation. Restriction of enquiry to one of these sources would, on the other hand, probably provide a limited and biased perspective.

Although programmes of academic study and laboratory training are usually designed and implemented by authority-based agents such as these, and their success may be measured by the extent to which technicians satisfactorily perform their job functions or by the success rates in formal examinations, the operational details and perceived effectiveness of such programmes may also be determined by analysis of information and opinion obtained from students themselves. They constitute a single data source with first-hand experience of every aspect of the education and training processes and may be expected to provide a perspective which is least affected by political or sectional interest.

The pursuit of this perspective, which is the objective of the present investigation, is not easily accomodated by Stake's model which, because it is designed primarily for the evaluation of secondary education curricula, implies a predominant teaching staff involvement as a data source.

The need for substantial external specialist support also appears to be a notable feature of the Stake model.

If the information which is to form the substance of this investigation is to be mainly descriptive and judgement data obtained from students, and relating to a wide variety of aspects of education and training, it would seem advisable to collect and analyse it in a readily understood and easily manageable form. The data would thus be more notable for its volume rather than for its complexity and the only external specialist assistance needed would probably be for the design of a computer programme which would permit the manipulation of the data in a numerical form.

Bolam R.(1975) recognises in educational innovation the elaborate array of agencies that are clearly identifiable within the sphere of medical laboratory technician education and training and he recommends a multiple-perspective approach in order to acquire a full understanding of innovation processes. Although such an approach would be appropriate and desirable for the present investigation, it has been seen to be prohibitively demanding.
The model which Bolam offers also takes into account a temporal dimension which is felt to be more appropriate to continuous observation of curriculum change and development, rather than to the time-fixed approach which is adopted in this investigation.

Taylor and Dale (1971) undertook a curriculum evaluation study which is in many ways analogous to the present investigation. Their survey was also concerned with a subject area which extended beyond the confines of the strict curriculum and attempted to identify on a broad front, opportunities to improve the effectiveness of training processes for young people at work, after they had completed their full time education.
These investigators chose to pursue a comprehensive portrayal of teachers in their first year of service, rather than to apply in-depth analysis to a limited number of prespecified characteristics. They also employed the actual subjects of their survey as a major data

source and used certain instruments and methods of analysis which are felt to be particularly applicable to the present investigation.
In order to measure change of attitude in their subjects, the Taylor and Dale survey employed repeated sampling after an appropriate time interval. In this respect it differs from the present study which is to use a time-fixed, single sampling approach.

Tyler R. (1949) presents a model for curriculum evaluation which is primarily intended to measure students progress towards instructional objectives. The model also seems to be quite readily adaptable to evaluation in the acquisition of occupational skills as well as of academic learning. This model is however less likely to easily accomodate investigation of the wide variety of factors which are felt to merit attention within the present investigation.
Tyler does however employ an eight-point scheme to describe the major characteristics of several notable models for curriculum evaluation, including that of Robert Stake. This scheme provides a valuable means of mapping out the important features of a framework appropriate to the present investigation and demonstrates aspects of this framework which are similar to or different from evaluation models devised by Stake and other investigators.

Table 2.1.

Prototype Evaluation Model for the Present Investigation

Key Emphasis	Description and Opinion.
Purpose	To identify ways in which the present arrangements and provisions for the education and training of medical laboratory technicians may be made more effective.

Key Activity	The identification of strengths and weaknesses of the present arrangements and provisions.
Key Viewpoint	Medical laboratory technicians who are pursuing courses of study and training programmes.
Outside Experts Needed	Computer Programmer.
Expected Teaching Staff Involvement	None.
Risks	Overvaluation of the Students perspective: Neglect of teacher, instructor and organisational perspectives.
Pay-Off	Broad portrayal of curriculum: identification of merits and shortcomings of the present arrangements as perceived and felt by students: Identification of ways in which the present arrangements may be improved.

In order to locate this framework in the wider context of curriculum development, as it applies to the education and training of medical laboratory technicians, is is helpful to consider the curriculum development model proposed by Skilbeck M. (1976) (see table 2.2. p73). In the simplest terms, this model approaches curriculum evaluation and development as a cyclic process which involves five main stages. Skilbeck recognises that most exercises in curriculum evaluation and development begin with an initial complex situation which requires modification or management.

The first stage of his model therefore consists of a comprehensive analysis of the internal and external factors which constitute the

Table 2.2.

Malcolm Skilbeck's "Model for Curriculum Development"

1 Situational analysis

Review of the change situation		Analysis of factors which constitute the situation
a external	(i)	cultural and social changes and expectations including parental expectations, employer requirements, community assumptions and values, changing relationships (e.g. between adults and children), and ideology;
	(ii)	educational-system requirements and challenges, e.g. policy statements, examinations, local authority expectations or demands or pressures, curriculum projects, educational research;
	(iii)	the changing nature of the subject-matter to be taught;
	(iv)	the potential contribution of teacher-support systems, e.g. teacher training colleges, research institutes, etc.;
	(v)	flow of resources into the school;
b internal	(i)	pupils: aptitudes, abilities and defined educational needs:
	(ii)	teachers: values, attitudes, skills, knowledge, experience, special strengths and weaknesses, roles;
	(iii)	school ethos and political structure: common assumptions and expectations including power distribution, authority relationships, methods of achieving conformity to norms and dealing with deviance;
	(iv)	material resources including plant, equipment, and potential for enhancing these:
	(v)	perceived and felt problems and shortcomings in existing curriculum.

2 Goal formulation

The statement of goals embraces teacher and pupil actions (not necessarily manifest 'behaviour') including a statement of the kinds of learning outcomes which are anticipated. Goals 'derive' from the situation analysed in 1 only in the sense that they represent decisions to modify that situation in certain respects and judgements about the principal ways in which these modifications will occur. That is, goals imply and state preferences, values and judgements about the directions in which educational activities might go.

3 Programme building

a design of teaching-learning activities: content, structure and method, scope, sequence;
b means-materials, e.g. specification of kits, resource units, text materials etc.;
c design of appropriate institutional settings, e.g. laboratories, field work, workshops;
d personnel deployment and role definition, e.g. curriculum change as social change;
e timetables and provisioning.

4 Interpretation and implementation

Problems of installing the curriculum change, e.g. in an on-going institutional setting where there may be a clash between old and new, resistance, confusion, etc. In a design model, these must be anticipated, pass through a review of experience, analysis of relevant research and theory on innovation, and imaginative forecasting.

5 Monitoring, feedback, assessment, reconstruction

a design of monitoring and communication systems
b preparation of assessment schedules
c problems of 'continuous' assessment
d reconstruction/ensuring continuity of the process

change situation. From this, he proceeds through stages of goal formulation and of programme building, to a fourth stage of interpretation and implementation.

The final stage of monitoring, feedback, assessment and reconstruction provides the evaluator with opportunity to continue the evaluation and development process by applying once again the first stage of situational analysis to the modified change situation.

Skilbeck considers the model to be equally suitable for exercises in the design of curricula, for observation and assessment of curricula, and for more theoretical task analysis in curriculum development.

He emphasises that initial intervention into a curriculum process at any one of the five stages which the model describes, may be practicable and desirable and that the model should not be thought to compel an evaluator to pursue the respective stages in a strictly logical order: it may instead be adapted to accomodate a variety of analytical approaches.

Perhaps the most important feature of Skilbeck's model is that it encourages an evaluator to consider the widest variety of factors and elements and to view the process of curriculum development as an organic whole. The breadth of view which this model promotes, coupled with its adaptability, allows the present study to be located within the framework of this model with little difficulty and with much advantage in the selection of appropriate analytical methods.

The essential elements of the Skilbeck model can be readily identified within the elaborate innovation process which, between 1962 and 1976, took place in the education and training of medical laboratory technicians.

In the publications of the Institute of Medical Laboratory, the Medical Laboratory Technicians Board of the Council for Professions

Supplementary to Medicine and the Department of Education and Science, and also in reports of Joint Committees and Working Parties set up during the period, there is evidence that situational analysis in one form or another was undertaken and that goals were identified.

New programmes of academic study and laboratory training, and modified structures for examination and qualification were devised and have been interpreted and implemented at organisational and individual levels within the laboratory service and the Further Education service.

Mechanisms for monitoring and assessment have been developed by the bodies responsible for academic qualification and for the certification of competance to practice.

In the context of the Skilbeck model, the present investigation may therefore be seen to come at the end of a complete cycle of curriculum development when, in accordance with the cyclic structure of the model, analysis of the changed situation might be expected to precede a further phase of development: it may be viewed as a situational analysis stage, the aims and extent of which are circumscribed by the objectives of the investigation and with regard for the perspective that will be provided by the chosen source of data.

In his design for situational analysis, Skilbeck lists an extensive range of internal and external factors which may need to be studied in order to permit a full understanding of the situation.

Because the model appears to have been devised primarily for the purpose of curriculum evaluation and development work in the primary or secondary spheres of education, it is necessary to translate certain of Skilbeck's factors into terms that are appropriate to Further Education and to occupational training.

A similarly extensive range of factors certainly exists as components of the present situation of education and training for medical laboratory technicians, but although all these factors might require examination prior to the development of essentially new programmes of education and training, the more modest purpose of this investigation and the particular perspective which is to be adopted is considered to justify a selective approach to the factors which constitute the situation.

Accordingly, certain of what Skilbeck describes as external factors do not figure prominently in the investigation: cultural and social changes; the expectations of students, employers and the community; changing occupational relationships; all fall within this category. So too do the essential requirements and conditions laid down within the systems of education and training.

The changing nature of the subject matter of academic study and laboratory training, the characteristics of teacher and laboratory instructor support systems, and the flow of resources into colleges and laboratories are also felt to be factors which are peripheral to the central objective of the investigation. Some of these factors are determined by decree, others would require prohibitively elaborate investigation, and some are clearly factors upon which students can not be expected to make informed comment or provide reliable information. These factors are not however entirely excluded from the investigation, for the chosen instrument of enquiry will provide students with opportunity to make unrestricted comment relating to these factors, and any significant evidence revealed by such comment with be considered along with other findings.

It is however the aspects which, in the Skilbeck model, fall into the category of internal situational factors, that appear to be most relevant to the question " how can the present arrangements and provisions for the education and training of medical laboratory technicians be made more effective".

Represented in terms appropriate to the subject area, these factors may be summarised as follows:

1. The Students Their qualifications, level of entry to the career, career counselling, employment circumstances, expectations, job valuation, professional affiliations.
2. College Studies Type of course, level of course, mode of attendance, academic counselling, curriculum, course structure, teaching strategies, physical resources for study.
3. Laboratory Training Amount of training, regularity of training, sources of instruction, nature of the instruction, the relating of training to academic study, physical resources for training.
4. College Studies and Training Objectives of college study and of laboratory training.

Data relating to these factors, obtained from students with first-hand experience of the processes of college study and of laboratory training, will fall into two main categories.

Firstly, factual information upon the students themselves and upon the operational characteristics of the courses and the training programmes which they have experienced: this may be expected to be relatively free from subjective bias and will provide a descriptive portrayal of the present arrangements and provisions and of the students - it will reveal what is happening, how it is happening, and to whom it is happening.

Secondly, information in the form of opinion: this will permit, from a student perspective, the identification of the perceived and felt merits and shortcomings of the present arrangements and provisions. Such data may, by simple analysis, provide some indication of where improvement of the effectiveness of the present arrangements might be made.

It is however anticipated that evidence of a considerably more specific and precise nature will be obtained by correlative analysis, in which the opinions which students express and the factual information which they record is examined against certain of the factors which constitute the present situation. The most important of these are seen to be:

1. <u>Factors relating to academic studies</u>.
    (a) The mode of study (course type) - day release or sandwich course.
    (b) The level of study - Ordinary National Certificate and Diploma courses or Higher National Certificate and Diploma courses or Fellowship courses.

2. <u>Factors relating to laboratory training</u>.
    (a) The institutions in which students are employed or trained.
    (b) The departments in which the students are employed or trained.

These factors are considered to constitute the most prominent independant variables which can be identified within the present situation. Exploration of the relationship of these to other factors upon which the effectiveness of study and of training may depend will add a valuable explanatory dimension to the investigation.

Applied to factual data collected from students, this analysis may demonstrate significant qualitative or quantitative variations in the content or conduct of college studues and laboratory training. It will also show the extent to which any such variation is dependant upon the type of course and the level of study which students pursue and upon the places where they are employed and trained.

Similar relationship analysis applied to data in the form of student opinion will show the extent to which motivational factors and attitudes which may influence the effectiveness of training and study, are determined by the type of course, the level of study and the place of employment and training.

Exploration along these lines will thus add to the descriptive portrayal of the present situation by revealing, from the students' viewpoint, the relative merits and shortcomings of different course types, levels of study and places of employment and training, with regard to the present effectiveness of academic study and laboratory training.

This evidence will provide at least tentative indications of the ways in which improvement of the present arrangements and provisions might be accomplished.

The Skilbeck Model of curriculum development is employed as a broad framework for the investigation.

Certain of the perspectives offered by Stake and by Tyler are adopted in the approach to evaluation.

The work of Taylor and Dale is used as a model in the design of the analytical instrument and the procedures employed in the collection, analysis and presentation of survey data.

Chapter Three

The Research Design and its Implementation.

Contents Page No.

Section 1. The Sample Population.

The objectives of the investigation and the analytical framework which had been adopted, clearly required a survey population consisting of medical laboratory technicians with current personal knowledge and experience of the processes of vocational education and laboratory training.

Survey of the entire national population of technicians falling within this category would be precluded by the amount of time, labour and resources which this would entail, and the investigation was instead based upon survey of a representative sample of student technicians.

As well as being more practicable, this approach would allow the collection of more detailed information and permit a greater depth of analysis with a higher level of overall accuracy.

It was however, critically important that the chosen sample should be of a size and composition which would allow the construction of a situational portrait representing the national scene with accuracy and precision.

The situation under investigation exhibited many variable factors. Certain of these had been selected as explanatory variables and in order that their significance might be explored, it would be necessary to include in the survey population subjects representing a number of sub-groups in numbers sufficient to permit valid explanatory and comparative analysis.

A number of uncontrolled variables would also be present and for this reason the sample population would need to be sufficiently large to allow analysis and interpretation of data without undue bias or error. These considerations imposed a requirement that the sample population comprised of at least one hundred and twenty subjects so that each of the sub-groups created by the examination of the various experimental variables would be represented by at least fifteen individuals. Such a population might have been selected in a number of ways. The method which was adopted identified as the the sample the entire population of technicians attending, during 1976, courses in medical laboratory sciences at a college which operates as a regional centre for these courses.

This procedure was seen to have a number of important advantages. The subjects would be more readily accessible during their attendance at college than they would be in the work situation. During college attendance, students could be canvassed directly and simultaneously in large groups, and it would be possible to survey all groups within a short period of time.

In the working situation, the subjects would be dispersed among different departments and different institutions. Difficulties would almost certainly arise over the release of the subjects from their work activities and also in the provision of conditions suitable for the completion of questionnaires. The data collection process would thus tend to be fragmentary, laborious, and subject to a greater variety of uncontrolled variables.

For a number of reasons, survey of the subjects during their attendance at college was also thought to be preferable to postal enquiry. The non-response rate in postal surveys is usually much greater than that obtained by face-to-face enquiry. Furthermore, there could be no guarantee that postal enquiry would be answered by the chosen subjects or that their responses would not be influenced by other persons. Responses obtained by postal enquiry would also tend to lack spontaneity and this was felt to be important in relation to certain aspects of the investigation.

The students population attending courses in medical laboratory sciences at Llandaff College of Technology in Cardiff, appeared to meet the requirements of the investigation and was therefore employed as the sample.

It was of sufficient size, and was suitably representative in terms of the main explanatory variables. Ready access to the subjects was possible without undue disturbance of their studies and it was possible to canvass them directly in class groups over a short period of time so that the views obtained would be expressed spontaneously and without external influence.

Section 2. The Survey Instrument.

Of the several methods that might have been employed for the collection of survey data, a questionnaire, completed by the survey subjects, was considered to be most appropriate to the investigation, and was accordingly chosen as the survey instrument.

The use of a questionnaire would permit the collection of information which was unobtainable from documentary sources and which could not be acquired by observational methods. A questionnaire was also felt to be preferable to an interview procedure because it would not require trained interviewers and would be be free of interviewer bias and error.

Under the conditions in which the sample population were to be surveyed, the use of a questionnaire offered a means of collecting data in a uniform manner, under relatively standardised conditions, over a short period of time, and in a form suitable for analysis.

Structure and Content.

The specification of the questionnaire followed directly from the stated objectives of the investigation and from the analytical framework which had been adopted.

It was required to provide for a broad portrayal of the situation, with particular reference to a description of the main characteristics of the survey subjects, their college studies, laboratory training, and the ways in which their college studies and laboratory training interrelated.

It should also permit the measurement of opinion related to certain aspects of college study and laboratory training, and allow analysis of the significance of certain explanatory variables.

The questionnaire was therefore set out in three main sections. The first of these would seek information which would provide a portrait of the predominant characteristics of the sample population, and contained sub-sections concerned with biographical data, educational qualifications, present and previous employment and membership of the professional organisation.

The second section was concerned with the students' college studies and contained sub-sections relating to attendance, course information, curriculum, and course development.

In the last section, enquiry was focussed upon the arrangement and content of laboratory training programmes and also included a final sub-section which explored the interrelationship of college studies and laboratory training.

The questionnaire was concluded with an open question inviting the respondant to comment on any aspect or item in, or pertaining to, the survey.

The greater part of the information which the questionnaire sought of a factual nature and in the form of opinion, was pursued by the use of closed questions. In some of these, the respondents were required to record numerical data, but the majority of closed questions were accompanied by checklists in which responses were to be recorded by ticking. In many of these closed questions, the range of possible responses was limited and predictable. Where this was not so, an "Other" category was included in the checklist and respondents were requested to specify the category.

Closed questions have the advantage of being easier and quicker to answer and in this investigation, this was an important consideration because the width of enquiry required the collection of a large amount of information. A further advantage of closed questions would be that data would be obtained in a form that could be readily analysed in a quantitative manner.

It was however recognised that closed questions would impose constraints upon the respondents and might prohibit responses which could add a valuable depth and richness to the information obtained. In those sections of the questionnaire where unrestricted and spontaneous responses in the respondent's own language was expected to be particularly revealing, closed questions were supplemented by open questions.

Question sequences in each sub-section of the questionnaire generally began with a factual opening, developed through a series of closed questions, and ended in an open question which permitted respondents free expression upon the topic.

Questions were worded in a manner felt to be understandable by the least able respondent and were phrased in a way that was thought to be least likely to prejudice responses.

It was clearly necessary to provide the survey subjects with certain explanatory information and assurances prior to their completing the questionnaire. The first page of the questionnaire was therefore set out in the form of a letter of introduction which explained the purpose and potential value of the survey and stated that it was being undertaken with the approval of employing authorities and of the college authorities. Firm assurances were given that all the information collected would be treated with confidentiality, and complete anonymity was guaranteed. In requesting the co-operation of the survey subjects, the letter stated clearly that completion of the questionnaire was an entirely voluntary matter and that it may, without giving any reason, be returned unanswered.

Section 3. Pilot Work.

Pilot evaluation of the questionnaire was felt to be essential for a number of reasons.

The suitability of the letter of introduction would need to be assessed and the wording of questions would require testing with respect to their intelligibility and lack of ambiguity.

Means of reducing non-response might be revealed by piloting and the appropriateness of rating scales could be examined.

Pilot study would provide valuable indications of the effectiveness of questions in eliciting the data required and would also allow some prediction of subject compliance and resistance.

Measurement of the average completion time for the questionnaire was a further important feature of the pilot study.

In order to minimise attrition of the sample population, the pilot survey sample was chosen by random selection of one student from each of the five course types. These subjects were appraised of the purpose of the pilot survey and were then requested to read the letter of introduction and complete the questionnaire in conditions similar to those under which the full survey would eventually be carried out.

Upon completion of the questionnaires, the pilot survey subjects were subjected individually to a structured interview in which was sought their opinions of, or reactions to, three main aspects of the questionnaire.

First, their attitudes toward the important features of the letter of introduction were determined.

Second, they were asked a series of questions in order to assess the validity of the survey questions and to identify any structural or contextual defects or omissions within the questionnaire.

Third, their opinions were sought upon certain broad characteristics of the questionnaire, with a view to identifying any features which might give rise to a serious level of non-compliance or which might adversely affect the validity of responses.

As a result of the pilot study, the letter of introduction was used without alteration in the main survey but the instructions upon the manner of completion of the questionnaire were improved.

Analysis of the responses obtained, together with study of the questionnaires which the pilot survey subjects had completed, led to thirty three of the forty two questions in the pilot questionnaire being retained in their original form.

Five questions were modified slightly in respect of wording or positioning, and four were modified substantially by the extension of checklist items or by adjustment of rating scales.

Four questions were found to be superfluous and were discarded and five new questions were introduced.

The sequence of one group of questions was rearranged and instructions directed towards particular subject groups were inserted in bold typeface.

In order to facilitate the distribution, collection and processing of the questionnaires, quantities of them were printed with the front pages of different colours and each of the sub-groups within the survey population was allotted a particular colour.

Coding boxes were printed in a column at the right hand side of the questionnaire, adjacent to the response matrix for each question.

Section 4. Action Component.

In the initial planning stages of the investigation, a checklist was prepared in order to identify the the action that would be necessary in order to complete the survey.

The main activities were seen to be:

1. The acquisition of approval for the use of material resources and support staff.
2. The acquisition of approval of the investigation by all employers of the survey subjects.
3. The pilot survey and the analysis of the pilot survey data.
4. The preparation of the questionnaire and of a suitable computer programme.
5. The main survey and the analysis of the data obtained.

The first two of these activities involved external agencies and were therefore pursued as preliminary measures.

1. Approval for the use of material resources and support staff.

The major material resource requirements would be substantial quantities of stationary, duplication facilities, and access to a computer and ancillary data processing equipment.

A significant amount of support-staff assistance would be required, mainly for the design of a suitable computer programme and for the transfer of survey data to computer punch cards.

These resources were available within the college at which the survey was to be undertaken and in May 1975 formal approval was granted for their employment in the investigation.

2. Approval of the investigation by all employers of the survey subjects.

A large proportion of the population chosen for the survey were employed full time in medical laboratories in hospitals and other institutions and it was considered necessary and proper that the employers of these students should be informed of the proposed investigation and that their approval of it should be sought. Consultation with these employers would ensure that in the survey, any particularly sensitive issues were avoided or handled with appropriate delicacy. Knowledge that the investigation in which they were invited to take part had the approval of their employers, could be expected to provide important reassurance for the survey subjects and would probably heighten their compliance.

An analysis of college records showed that the students attending part time courses in medical laboratory sciences during 1975 were employed in fifteen separate establishments within the South Wales area.

Most of these laboratories, and certainly those in which the great majority of the survey subjects were employed, were administered by the South Glamorgan Area Health Authority, and their domestic policies were determined by the Division of Pathology within that Authority. The remaining laboratories were subject to more independant internal control within District General Hospitals or in specialised establishments such as the Medical Research Council's Pneumoconiosis Research Unit, the Public Health Laboratory Service and the Tenovus Research Institute.

Taking account of these rather varied patterns of administration and control, a consultative letter was sent to the Training Officer of the South Glamorgan Area Health Authority and to the Chairman of the South Glamorgan Area Health Authority Division of Pathology in respect of those laboratories within that Authority, and to the Consultant Pathologists or Directors with administrative responsibility for the remaining laboratories.

A variety of replies were received. Several gave unreserved approval to the proposals, some showing considerable interest in the investigation and offering any help that might be necessary. One respondent gave full approval after requesting and receiving a copy of the draft questionnaire.

The South Glamorgan Area Health Authority Division of Pathology responded to the letter by inviting the investigator to explain the proposals more fully at a meeting of its Site Committee. This was done and approval was given subject to the Committee being informed should any new area of study be included. This was agreed.

The Training Officer of the South Glamorgan Area Health Authority suggested a meeting to discuss the proposed investigation and at that meeting expressed certain reservations with regard to the possible effects which the survey might have upon attitudes towards laboratory staffing policies, which at the time were particularly sensitive. The general principle of the proposals were however approved and it was agreed that there would be no objection to the investigation provided that the suvey was not undertaken until 1976.

Approval of the investigation, subject to the conditions that had been agreed, had been received from all employers of the survey subjects by February 1976.

Section 5. Operational Timetable.

Following the receipt in May 1975, of approval for the use of the necessary resources, an operational timetable of the main survey activities was drawn up. The timing of these activities was closely interdependant and would need to take account of external circumstances and in particular should allow the actual survey to be carried out at the most appropriate time.

Certain aspects of the questionnaire would draw upon students' experience of work, training and college studies and for subjects who were in their first year of employment or college study it was therefore clearly desirable to conduct the survey as late as possible in that year, so that their responses might be based upon an adequate period of experience.

It was anticipated that the various preliminary arrangements could be completed during the latter part of 1975 and the survey period was provisionally set for May 1976 - at the end of the academic year but before students became pre-occupied with examinations.

In order to obtain, as far as was possible, the most uniform survey conditions, and to minimise the likelyhood of non- spontaneous responses, it was arranged that all student groups be surveyed during a single week, in a study period normally assigned to general studies.

Students who were absent from college during that week would be asked to complete the questionnaire at the earliest convenient opportunity. Allowing for some delay in the return of these questionnaires, the survey data would be transfered to the computer store and analysed during the period June - November 1976.

This timetable was followed as described.

Operational Timetable

May 1975	Approval received for the use of material resources and support staff.
Oct./Nov. 1975	Pilot survey and analysis of pilot survey data.
Dec. 1975 - Feb. 1976	Preparation of questionnaire. Preparation of computer programme.
February 1976	Approval of proposals for investigation received from all employers of survey subjects.
May 1976 (10th.-14th.)	Main survey carried out.
June - November 1976	Data compilation and analysis.

Two hundred and thirty four students were enrolled in the courses from which the survey population was drawn. Of these, two hundred and thirteen completed the questionnaire during the survey period or within the following three weeks.
The remaining twenty one subject had either left their course prior to the survey period or failed to return a completed questionnaire. None of the subjects who were approached directly during the survey period declined to participate.

Section 6. Data Processing.

The format of the questionnaire was designed with the close co-operation of the computer programmer.

Responses in the completed questionnaires were to be translated into a digital form and recorded in coding boxes adjacent to each question matrix. This digital data would then be transferred to punch-cards and a card reader would be employed as the data input route to the computer store.

The computer was a Computer Technology Modular I within which data was stored on file in a cartridge disc.

The programme was designed to read the file and extract data as required, and could be used in an interactive or batch mode according to the form of a particular enquiry.

Data output was available through a V.D.U., a teletype, or a line printer, chosen according to the nature and magnitude of each enquiry and expected data yield.

The maximum number of responses in a completed questionnaire would yield two hundred and thirty nine digits and would require the same number of punch-card columns.

The data obtained from each of the survey subjects was therefore recorded on three, eighty-column punch-cards prior to transfer to the computer file.

The punch-cards and data file for each of the survey subjects was identified with a unique number to permit the checking and the verification of data.

Simple coding frames, determined by the structure of the questions, were employed for the coding of closed questions.

For open questions, coding frames were drawn up by scanning the spread of responses in the completed questionnaires. Certain of these questions yielded a variety of responses which were sufficiently limited to permit quantification. Other open questions produced a very wide range of responses which were simply coded as "quotable" or "non-quotable" and used as qualitative illustrations of features of the situation which were felt to be significant.

Section 7. Data Analysis.

The objectives of the investigation require that the data obtained in the survey be analysed and presented in a way which provides both descriptive and explanatory evidence.

Descriptive data, relating to important characteristics of the survey subjects, their college study, and their laboratory training is presented in a standard tabular form showing distribution frequency as percentage values, illustrated by histograms.

Data representing expressed opinions of the survey subjects, is presented in a similar form and where explanatory evidence is sought, distribution frequencies are examined against the factors which have been selected as explanatory variables.

The data which was obtained in the survey is essentially categorical in nature and the chi-squared test has been employed to test the significance of variations imposed by the explanatory variables upon distribution frequencies.

In order to avoid the necessity of performing the chi-squared test for significance upon raw values obtained in every case where subject responses are set against the explanatory variables, percentage values presented in the tables were screened for significance by employing the nomograph described by Oppenheim A.N. (1966), adapted from an original device described by Zubin J. (1939). Where such screening showed positive or borderline significance, the chi-squared test has been applied. Yates's correction for continuity has been applied in calculating significance involving low response frequencies (twenty five or less).

Unless otherwise stated, statistical significance at the 5% level at the least has been the level of confidence adopted throughout the study.

It is emphasised that, because the data has been derived from questionnaire responses, all statements referring to employers and employment are subject to the qualification that they have been reported by students and have not been verified empirically. This qualification will be understood throughout the text.

Chapter Four

The Characteristics of the Survey Population

Contents

Section 1. The Size of the Survey Population.

Of the two hundred and thirty three medical laboratory technicians who were invited to participate in the survey, two hundred and thirteen returned completed questionnaires and thus comprised the survey population (n).

In 1976 the total number of technicians employed in Health Service laboratories in England and Wales was 13,598 and in Wales alone was 776 (Chief Scientific Offier's Unit. D.H.S.S.). These figures indicate that the survey population constituted 1.6% of technicians employed in England and Wales, and 27% of technicians employed in Wales. It should however be noted that the figures quoted above refer to all grades of technician, while the survey population is restricted to technicians in training. It is reported (Chief Scientific Officer's Unit. D.H.S.S.) that of the total technician force in Health Service laboratories in 1976, 42.3% were in training. On this basis the survey population would appear to constitute 3.7% of technicians in training in England and Wales and 65% of techncians in training in Wales.

Section 2. The Age, Sex and Marital Status of the Survey Population.

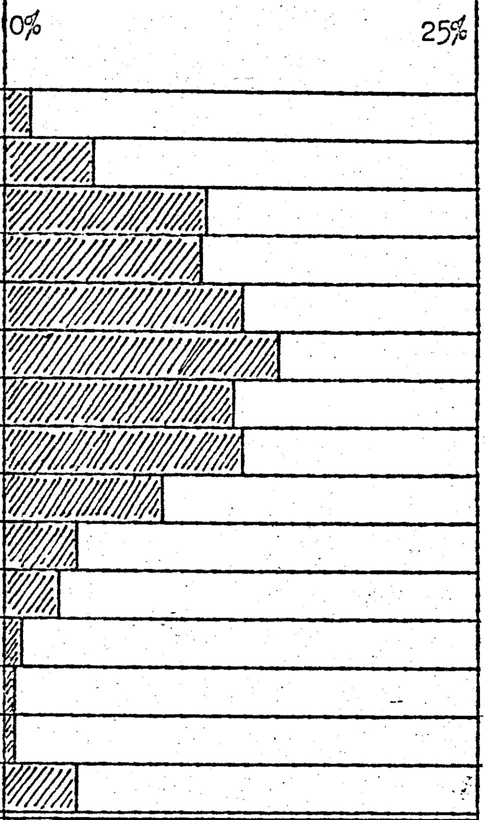
Age.

Fig.4.1. shows the age range of the survey population and as would be expected, largely reflects the normal entry levels of the career and of the college courses to which the survey subjects were committed. Thus with G.C.E. 'O' Level entry requirements, students in O.N.C. and O.N.D. courses would be expected to be within the 16 to 18 age range. With G.C.E. 'A' Level or O.N.C. or O.N.D. entry requirements, students in H.N.C. and H.N.D. courses would normally be within the 19 to 21 age range. Students in the S.F.I.M.L.S. course, with entry requiements of H.N.C. or H.N.D. or Degree would be expected to fall within the 21 to 23 age range.

Fig.4.1.

Age Range of the Survey Population.

Distribution of Students by Age (in years)	Frequency		
	f	%	0% 25%
16	3	1.4	
17	10	4.7	
18	23	10.8	
19	22	10.3	
20	27	12.7	
21	31	14.5	
22	26	12.2	
23	27	12.7	
24	18	8.4	
25	8	3.8	
26	6	2.8	
27	2	0.9	
28	1	0.5	
29	1	0.5	
Nil Response	8	3.8	
Total Sample	213	100	



The small number of survey subjects who were over twenty three years of age would be those who had either entered the career and thus the course, later than was normal or had been delayed by examination failure or other reasons, at some stage of their studies.

One interesting feature of the distribution of the survey population by age was that although there were 82 students attending the O.N.C. and O.N.D. courses (with an expected age range of 16 to 18 years), analysis of the actual age range showed that there were only 36 students in these courses who were less than 19 years of age.
Two explanations are offered for this apparent anomaly; both are thought to contribute. The survey was carried out at the end of the academic year. Second year students would as a consequence be found at the upper end of the age range and had they stayed on at school in order to sit additional or repeated G.C.E. 'O' Levels, they might well be beyond the expected range. Additionally, although it is not a feature which is to be explored by this survey, it is known that a considerable number of the survey subjects who were pursuing the O.N.D. course were overseas students who commonly enter this course at a greater age than British students.

Sex.

Fig.4.2. shows that of the total survey population, 114 (54%) of the subjects were male and 99 (46%) were female. This distribution agrees very closely with the findings of Crichton and Crawford (1963), who surveyed a population of technicians of all ages and grades.
During the thirteen years between that survey and the present one, two other reports recorded the frequency of males and females in populations of medical laboratory technicians.
Clarke (1970), reporting on a survey of 143 technicians selected in a way that is very similar to that of the present survey, found that

60% of the population he studies was female.

Four years later Allison (1974) reported that a population of technicians selected across the full age range and grading range contained 59% women.

Both these reports suggest an increase in the employment of women in laboratories in the years following the Crichton report of 1963. The results of the present survey appear to indicate a return to a 'Crichton-like' predominance of male technicians. It must however be recognised that the present survey was limited to technicians in training and for this reason it cannot be assumed to accurately reflect the characteristics of a population which includes the full age range and grading range. Comparisons with the findings of Crichton (1963) and of Allison (1974) can therefore be made only with considerable reservation.

Since the creation of the National Health Service in 1948 there has been no sexual discrimination in respect of conditions of service, salary and promotion for medical laboratory technicians. For this as well as many other reasons it has been a career that has consistently attracted a large proportion of women.

The present findings can certainly be said to show that the career continues to attract a proportion of female recruit that almost equals that of male recruits.

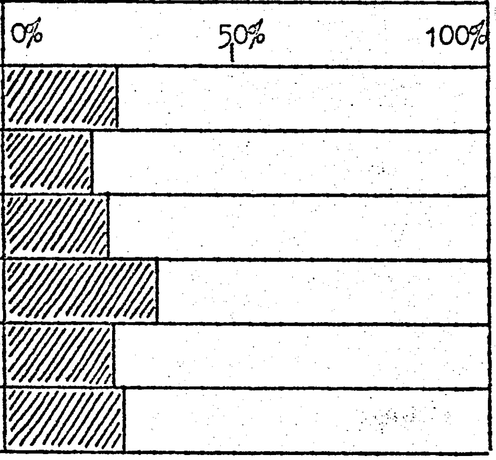
<u>Marital Status.</u>

Fig.4.2. also shows the distribution by sex of the married and single subjects of the present survey and also that in the British population (Census of Population Reports 1976). Although these findings show that the frequency of married males in the survey population exceeds that of the national population by more that 10%, this difference is not significant at the 10% level.

Fig.4.2.

Sex Distribution and Marital Status of the Sample and of the National Population.

Distribution of Subjects by Sex		Frequency			
		f	%A	%B	0% 50% 100%
Male	Survey pop.	114	23.7	76.3	
	National pop.*	3987	18.1	81.9	
Female	Survey pop.	99	21.2	78.8	
	National pop.*	3757	31.7	68.3	
Total	Survey pop.	213	22.5	77.5	
	National pop.*	7744	24.7	75.3	



* Number recorded for national population is in thousands.

A = ▨ = Married students

B = ☐ = Unmarried students

The frequency of married females in the survey population is over 10% less than that of the national population and this difference is significant at the 10% level.

As might be expected, these opposite trends result in a very similar frequency of married subjects in the two populations when the sex of the subjects is disregarded.

It must be noted that the data presented in <u>Fig.4.2.</u> for the national population represents the 15 to 24 year old age group and although this was the closest comparable statistic available, only 87.7% of the survey subjects were within this age range. The remaining 12.3% were either more than 24 years old (8.5%), or were non-respondants (3.8%). This discrepancy in the age ranges of the two populations must introduce an element of uncertainty into any comment upon the significance of the comparisons which have been made. As the major potential error is the inclusion of the 8.5% of the survey subjects who were outside the age range of the national population, it is probable that their exclusion would bring the frequency of married males closer to the national frequency. By the same token it is likely that the same exclusion would increase the difference in the frequency of married females.

With these reservations and qualifications in mind, the most that may be said of the findings presented in <u>Fig.4.2.</u> is that the marital status of the survey population is probably very similar to that of the national population. The frequency of married male subjects may be slightly greater, while the frequency of married female subjects appears to be somewhat lower than that of the national population. If these latter differences do in fact exist at a significant level, it is possible that the existence of a well-defined career structure with no sex discrimination may induce female technicians to defer marriage to some extent, while the security and salary structure of the occupation may encourage earlier marriage in male technicians. No national statistics on the marital status of medical laboratory technicians was obtainable. Even if such information were available, the differences in age ranges would make comparison with the findings of the survey of little value or significance.

Section 3. College Courses.

Fig.4.3. shows the distribution of the survey population by the college course attended at the time of the survey. Also shown is the total number of students attending similar courses throughout England and Wales.

It can be seen that the number of students attending the O.N.D. and H.N.D. courses constitute a very substantial proportion of the national population of these courses. This is because the college within which the survey was carried out is one of only nine centres which offer the Medical Laboratory Sciences variant of the O.N.D. in Sciences and is one of only three colleges which offer an H.N.D. course in Medical Laboratory Subjects.

The O.N.C., H.N.C. and S.F.I.M.L.S. courses, operated on a day release or block release basis, are, however offered at a larger number of centres and consequently the survey populations are a much smaller fraction of the national populations for these courses.

The numbers of students in the respective years of each course may reflect various trends in the employment, training and education of medical laboratory technicians. The most significant of these is, at the present time, the marked reduction in recruitment of technical staff into laboratories since 1974.

This reduction in recruitment has been caused by fiscal restrictions in the public sector, imposed as a result of the economic uncertainties which became apparent in the middle of the last decade. In the area from which the subjects of the survey were drawn, this nationally-apparent trend has been made more obvious because the University Hospital of Wales, commisioned in 1971, had by 1974 attained its full technician establishment and since that time recruitment has been held below wastage level.

These trends have had a direct effect upon the numbers of students in part time courses - enrolment to which is entirely dependant upon recruitment within the laboratory service. They may also have had an indirect effect upon student numbers in the full time college courses - O.N.D. and H.N.D..

Fig.4.3. shows that the number of students entering O.N.C. in 1975 was little more than half of the number which entered that course in 1974.

The effect upon student numbers in H.N.C. courses was less obvious, with equal numbers of students in both years of the course. It is to be expected however, that it would take longer for the effects of reduced recruitment to show through in the higher level courses and it is known that student numbers in H.N.C., as obtained in the survey, represent a peak from which there has been a distinct decline since 1975.

In contrast to the part time courses surveyed, the full time courses - O.N.D. and H.N.D. - show, for the stages of these courses represented by the survey, an obvious increase in student numbers.

The reason for such an increase may be a developing awareness, by school-leavers and those who advise them, that medical laboratory sciences is an attractive career. More specifically, enrolment to these courses has almost certainly been stimulated by recent reduction of direct job opportunities for school-leavers, especially for those who are keen to enter this particular career.

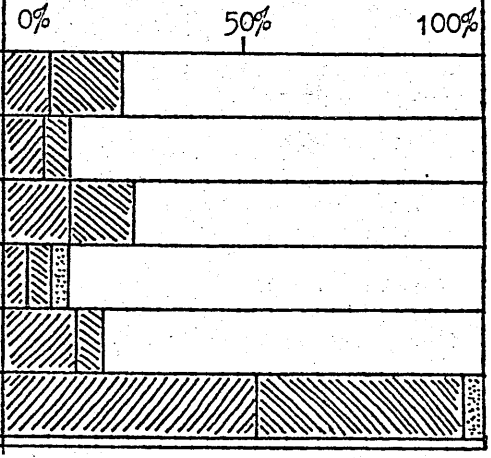
Since they were introduced, the O.N.D. and H.N.D. courses have been seen as 'another way in' to this career and the reduction in recruitment direct from school may well have compelled many would-be medical laboratory technician to take this view.

A further factor, apparent in many careers, is the general trend towards continuing full-time education after leaving school, with the

Fig.4.3.

Distribution of the Sample by College Course and Year of Course

College Course	Frequency			
	n	%A	%B	%C
O.N.C. (3,116)*	53	9.4	15.5	-
O.N.D. (224)*	29	8.4	5.2	-
H.N.C. (3,433)*	58	13.6	13.6	-
H.N.D. (135)*	29	5.6	4.2	3.8
S.F.I.M.L.S. (1,111)*	44	15.5	5.2	-
Total - All Students	213	52.5	43.7	3.8



A = ▨ = First Year of Courses

B = ▧ = Second Year of Courses

C = ▒ = Third Year of Courses

( )* = Total number of students in course in England and Wales during 1976.

acquisition of at least an initial vocational qualification before entering work.

Whether this is a desirable trend, either for prospective medical laboratory technicians or for school-leavers generally is a matter upon which the recent contraction of career opportunities has provoked vigourous debate. The nature of the intended career must be an important factor in this issue and in respect to medical laboratory sciences, the findings of this survey may make a small contribution to our understanding of the matter.

Section 4. Educational Qualifications.

In terms of academic qualifications, entry to the career is normally made at one of three possible levels.

Recruits leaving school with G.C.E. 'O' levels or C.S.E. Grade 1 passes in at least four subjects of which two are appropriate sciences may enter employment at Student Technician grade and pursue day release O.N.C. courses or may enter O.N.D. sandwich courses.

School-leavers possessing G.C.E. 'A' Level qualifications may enter employment at Junior Technician grade and pursue part time H.N.C. courses, provided they have passes in at least two science subjects and have at least studied Chemistry to 'A' Level standard.

Alternatively, the School-leaver with only one 'A' Level pass in a science subject may enter an H.N.D. sandwich course, provided Chemistry has been studied to 'A' Level standard.

Science graduates of British Universities may enter employment at Junior Technician grade and are promoted to Technician grade after working, and receiving training for one year in an approved laboratory. Graduate qualification normally permits direct entry to part time courses leading to Special Examination for Fellowship of the I.M.L.T..

Fig.4.4. shows the distribution of the survey population by the number of C.S.E. Grade 1 passes obtained.

Of the total population, only nine (4.2%) recorded possession of passes in at least four subjects and could thus have entered the career on the basis of these qualifications alone. Only a small proportion of students would therefore have qualified for either employment or full time courses by possession of C.S.E. passes.

A rather larger proportion of the survey population (20.6%) held some passes at C.S.E. Grade 1 and for most of these students such

Fig.4.4.

Distribution of the Students by the Number of C.S.E. Grade 1 Passes Held.

Number of C.S.E. Grade 1 Passes Held	Frequency		
	f	%	0% 50% 100%
0	161	75.6	
1	26	12.2	
2	2	0.9	
3	7	3.3	
4	6	2.8	
5	0	0	
6	0	0	
7	2	0.9	
8	1	0.5	
Nil Response	8	3.8	
Total - All Students	213	100	

Fig.4.5.

Distribution of the Students by the Number of G.C.E. 'O' Level Passes Held.

Number of G.C.E. 'O' Level Passes Held	Frequency		
	f	%	0% 50% 100%
0	2	0.9	
1	2	0.9	
2	5	2.3	
3	4	1.9	
4	16	7.5	
5	28	13.1	
6	33	15.5	
7	43	20.2	
8	35	16.4	
9	20	9.4	
10 or more	25	11.8	
Total - All Students	213	100	

passes would be additional to, or would supplement other qualifications acceptable as entry requirements.

Fig.4.5. shows the distribution of the survey population by the number of G.C.E. 'O' Level passes obtained.

Of the total population, 200 (94%) possess at least the four passes necessary to qualify for entry to the career at Student Technician grade. It will however be shown that a proportion of these students also possess more advanced qualifications - G.C.E. 'A' Levels or University Degrees - which would have permitted their direct entry to higher employment grades and more advanced courses of study.

Fig.4.6. shows the distribution of the survey population by the number of G.C.E.'A' Level passes obtained.

Four students (1.9%) held one 'A' Level pass, while fifty four students (25.3%) held two or more 'A' Level passes. Thus fify four students would have probably qualified for direct entry to Junior Technician grade employment and the H.N.C. course. Some of these students would however possess graduate qualifications and would therefore have qualified for direct entry to a higher employment grade and a more advanced course of study.

The four students who possess one 'A' Level pass will have entered the career either by joining the H.N.D. course or by recruitment at the Student Technician grade and pursuit of an O.N.C. course on the basis of their 'O' Level qualifications.

Fig.4.7. Shows the distribution of the survey population by the possession of qualifications obtained in Further or in Higher Education.

Where these qualifications are O.N.C., O.N.D., H.N.C. or H.N.D. in Medical Laboratory Subjects or Final Diploma of the I.M.L.T.,they

Fig.4.6.

Distribution of the Students by the Number of G.C.E. 'A' Level Passes Held.

Number of G.C.E. 'A' Level Passes Held.	Frequency		
	f	%	0% 50% 100%
0	125	58.5	
1	4	1.9	
2	32	15.0	
3	20	9.4	
4	2	0.9	
Nil Response	30	14.1	
Total - All Students	213	100	

Fig.4.7.

Distribution of the Students by the Further Education or Higher Education Qualifications Held.

Further Education or Higher Education Qualifications Held	Frequency		
	f	%	0% 50% 100%
'G' Course in Science	2	0.9	
O.N.C.: in M.L.S.	43	20.2	
in Applied Biology	3	1.4	
in Chemistry	4	1.9	
O.N.D. in M.L.S.	14	6.6	
H.N.C. in M.L.S.: (Microbiol.)	10	4.7	
(Haem./Serol.)	7	3.3	
(Histopath.)	8	3.8	
(Clin. Chem.)	8	3.8	
I.M.L.S. Final Diploma	2	0.9	
University Degree	10	4.7	
Other Qualifications	1	0.5	
Total - All Students	112	52.6	

will have been gained after entry or committment to this particular career.

The two students (0.9%) who possessed the General Course in Science qualification may have attained this before or after entry to the career, as a preliminary to entry to O.N.C. and necessary where the minimum Secondary Education qualifications had not been obtained prior to leaving school.

The seven students (3.3%) with O.N.C. qualifications in elective subjects other than Medical Laboratory Science, Biology or Chemistry for example, would almost certainly have entered the career after some time in a different occupation.

The ten students (4.7%) possessing degree qualifications would have attained these prior to entry to the career.

The one student who reported possession of an 'Other' qualification was found to hold S.R.N. qualification.

The findings presented in Figs. 4.4. - 4.7. yielded, on further analysis, the distribution of qualifications held on entry to the career as shown in Fig.4.8.

More than two thirds (68.5%) of the survey population entered the career by means of G.C.E. 'O' Level qualifications.

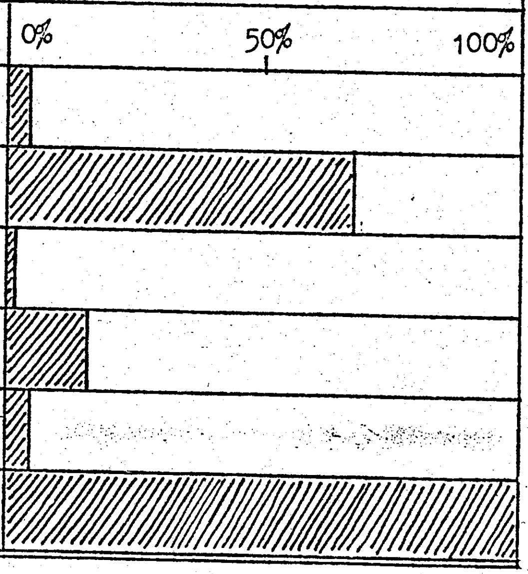
C.S.E. Grade 1 qualifications were presented by very few students (4.2.%) as the sole entry qualification.

G.C.E. 'A' Level qualifications appear to have constituted the necessary entry requirement for forty eight (22.5%) students who entered employment and H.N.C. or H.N.D. courses directly from school. The forty four students (20.7%) who possessed two or more G.C.E. 'A' Level passes would certainly have entered H.N.C. or H.N.D. directly. The four students (1.9%) who possessed only one G.C.E. 'A' Level pass will either have entered the career via the H.N.D.

Fig.4.8.

Distribution of the most advanced Qualifications held by students on entry to the Career.

Most Advanced Qualification	Frequency	
	f	%
C.S.E. Grade 1 (4 or more subjects)	9	4.2
G.C.E. 'O' Level (4 or more subjects)	146	68.5
G.C.E. 'A' Level (1 subject)	4	1.9
G.C.E. 'A' Level (2 or more subjects)	44	20.7
University Degree	10	4.7
Total - All Students	213	100



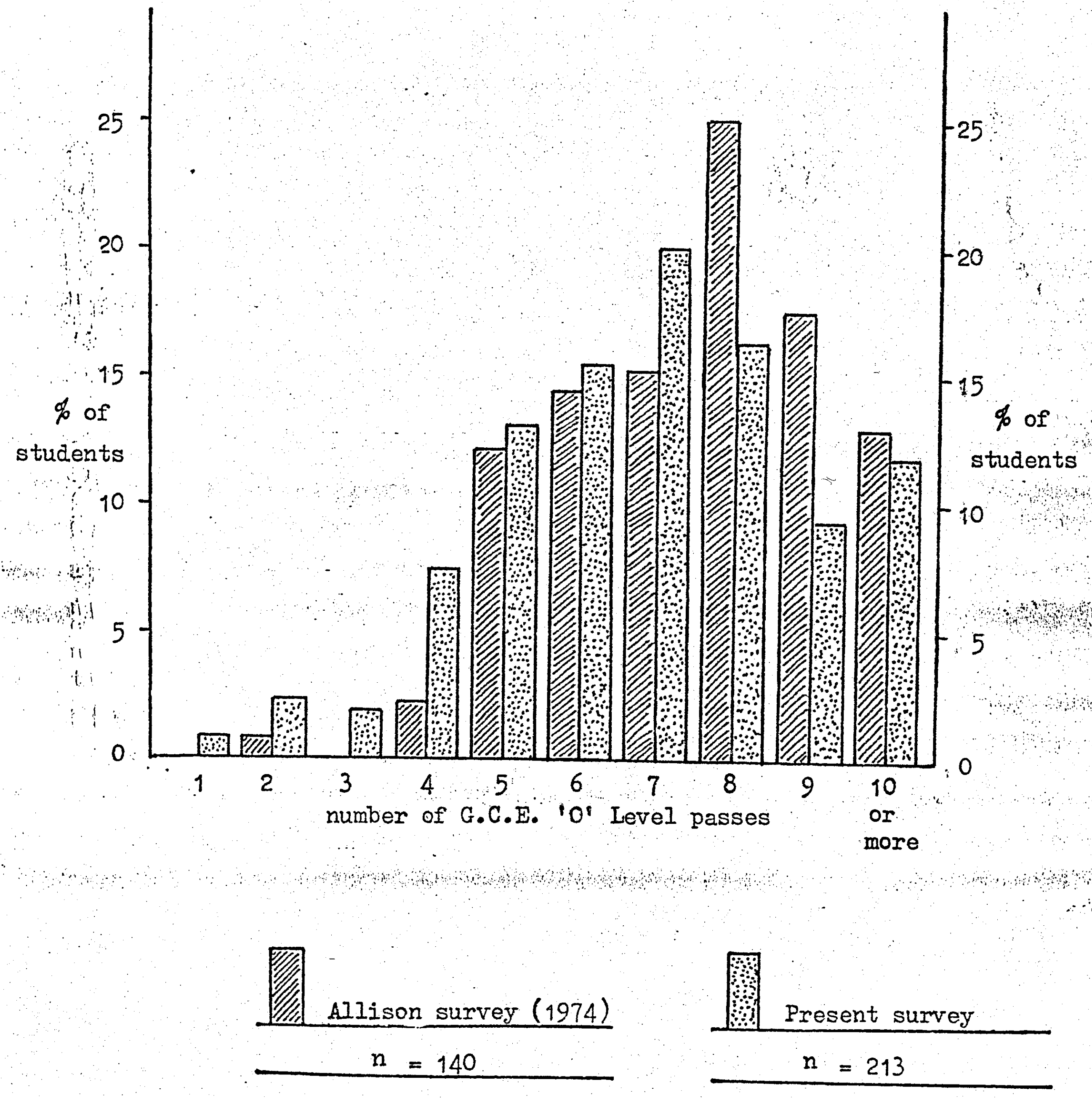
course or may have been recruited at the same level as recruits with G.C.E. 'O' Level or C.S.E. Grade 1 qualifications only.
Graduate entry, requiring a science degree of a British University was made by ten (4.7%) of the survey population.

No information appears to be available, either on a national or on a regional basis, concerning the qualifications held by medical laboratory technicians on entry to the career. There also seems to be little published research on the subject. Crichton A. and Crawford M.P. (1963) refer only to minimum entry requirements in terms of G.C.E. 'O' Level passes.
Allison R.T. (1974) presents some data upon G.C.E. 'O' and 'A' Level qualifications held by a group of technicians which he surveyed in Cardiff, and this does merit some comparison with the present findings.

Fig.4.9. shows the distribution of G.C.E. 'O' Level passes held by the population of the present survey compared with those held by the subjects of Allison's survey in 1974. It suggests only a slight downward movement in the number of passes held by recruits since 1974. It may however be evidence that various factors have modified a situation which Allison describes as "a possibility that recruits and staff are over-qualified for the job they have to perform".
A possible explanation for such a change may be that the decrease in recruitment that has occurred since 1974, coupled with the reduction in job opportunities generally, has encouraged those with rather better G.C.E. 'O' Level qualifications to remain at school and pursue G.C.E. 'A' Level qualifications, leading to other job opportunities or Higher Education courses.
The graduate recruits identified in the present survey may, in fact

Fig 4.9.

Distribution of the Students by the number of G.C.E. 'O' Level passes held - a comparison of findings of the present survey with those of Allison (1974).



equate with the rather better qualified 'O' Level recruits of Allison's survey, entering the career at a later stage.
The proportion of Allison's survey population which held G.C.E. 'A' Level qualifications (27.1%) is remarkably similar to that of the present survey (27.2%) and suggests that recruitment at this level has remained virtually constant.

Allison also records possession of C.S.E qualifications by eleven (7.9%) of his survey population and although he does not refer to the grade of these passes, comparison of this frequency with that which occurs in the present survey (20.6%), does suggest that this qualification is being offered by an increasing proportion of recruits and is accepted by employers as either an equivalent to, or as a complement to, G.C.E. 'O' Level passes.

Allison makes no reference to university degree as an entry qualification and the possession of such qualifications even by a minority of the subjects of the present survey may represent a significant development.

These findings show the distribution of academic qualifications which the survey subjects present as a means of entry to the career at three levels.
A significant number of recruits enter at each of these levels, the majority doing so at the Technician grade by possession of the necessary G.C.E. 'O' Level qualifications.

Section 5. The Employing Institutions.

The institutions within which the survey population was employed or trained comprised eleven hospitals, one regional blood transfusion centre and a small undefined number of university, research and commercial establishments in which some form of medical laboratory work is undertaken.

Of the eleven hospitals, five are District General Hospitals providing a comprehensive pathology service which includes facilities for all routine laboratory investigations. A sixth hospital has limited laboratory facilities, and is administered as an outpost of one of the five District General Hospitals.

The remaining five hospitals fall within a single Area Health Authority and constitute a Teaching Group. In addition to the provision of a routine pathology service in all the specialised disciplines, these hospitals have teaching and research commitments as well as various specialised functions in respect of which they provide a regional service as well as a local one.

The regional laboratory of the National Blood Transfusion Service provides a service for the whole of Wales on a two-fold basis. On the one hand it provides the necessary laboratory support for the collection, testing, storage and issue of blood and other products. In addition it provides a specialised reference and investigation service for problems associated with Blood transfusion.

The remaining employing institutions, described throughout this study as 'Other' institutions, comprise a heterogeneous collection of university departments, research units operated by the Medical Research Council and by charitable institutions, and commercial laboratories largely concerned with the development and production of pharmaceutical products. In all of these establishments the laboratory work is such that courses in medical laboratory subjects provide the most appropriate vocational education for the technician staff which they employ.

Fig.4.10. shows the distribution of the survey population by the employing institution.

Of the two hundred and thirteen students who made up the survey population, sixty five (30.5%) were employed, or in the case of O.N.D. and H.N.D. students had received training in, the District General Hospitals.

The five hospital which constitute the teaching hospital group employed, or in the case of O.N.D. or H.N.D. students trained, one hundred and nineteen (55.9%) of the survey subjects. The blood transfusion centre employed three (1.4%) of the subjects and the miscellaneous establishments referred to as 'Other' institutions employed twenty six (12.2%).

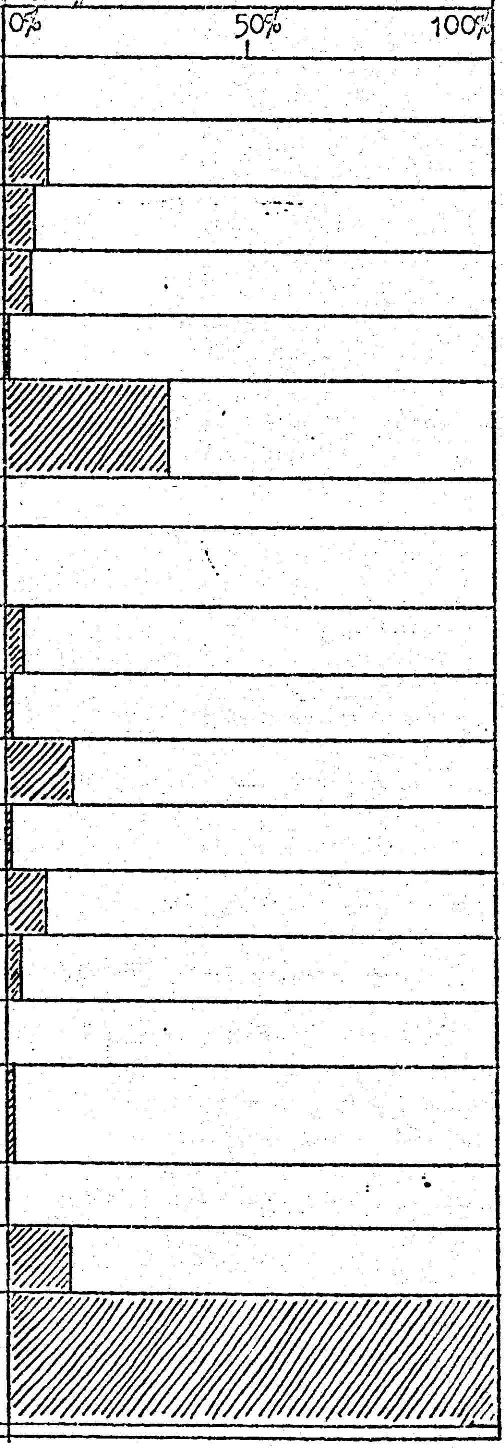
At the time of writing, no figures are available for the total number of technicians in training throughout Wales. It is known that there are seven hundred and seventy six medical laboratory technicians of all grades employed in Health Service laboratories in Wales. It is also known that of all grades of technicians employed in England and Wales, 42.3% are in training (Chief Scientific Officer's Unit. D.H.S.S.). If this percentage is applied to the staff within Welsh laboratories, it would appear that three hundred and twenty eight technicians would be in training in the Principality when this survey was undertaken.

These derived figures are acceptable for comparative purposes to the extent to which staffing and establishment policies are uniform throughout England and Wales. On this premise it would seem that the teaching hospital group employed, at the time of the survey, 36% of

Fig.4.10.

Distribution of the Students by Employing Institution.

Institution	Frequency		
	n	f	%
Teaching Hospital Group			
Cardiff Royal Infirmary	-	19	8.9
Llandcugh Hospital	-	13	6.1
St.David's Hospital	-	12	5.6
Sully Hospital	-	1	0.5
University Hospital of Wales	-	74	34.7
District General Hospitals			
Bridgend General Hospital	-	7	3.3
Caerphilly Miners Hospital	-	3	1.4
East Glamorgan Hospital	-	30	14.0
Nevill Hall Hospital	-	2	0.9
Royal Gwent Hospital	-	17	8.0
St.Tydfil's Hospital	-	6	2.8
Regional Blood Transfusion Centre	-	3	1.4
'Other' Institutions	-	26	12.2
Total - All Students	213	213	100



all technicians in training in Wales, while the District General Hospitals employed 20%.

Disregarding the survey subjects who were employed in laboratories outside the Health Service, the survey population appears to include 42% of the medical laboratory technicians in training in Wales during 1976.

These figures clearly reflect the concentration of laboratory services which exist in south east Wales and also illustrates the extent to which the college at which the survey was carried out, serves the educational needs of medical laboratory technicians in Wales: they also provide an important indication of the extent to which the findings of this investigation may be considered to represent the circumstances, views and opinions of medical laboratory technicians in training in Wales.

Section 6. The Employing Departments.

The specialised disciplines of medical laboratory sciences may be differentiated and classified in a variety of ways according to the criteria employed, the most obvious of these being:

1. Organisational and administrative considerations.
2. The identification of a recognisable body of specialised knowledge, technique and expertise.
3. The type of disorder or the nature of the material under investigation.

All such criteria are subject to various limitations and shortcomings and in practice, departments are organised within the laboratory service in a way which reconciles all these criteria in an arrangement which best meets local conditions and requirements.

The classification of departments which is employed in this survey is similarly a compromise which it is thought will permit meaningful differentiation of the survey subjects working situations within institutions with a minimum of confusing fragmentation or ambiguity.

The department described as "Microbiology" therefore includes not only diagnostic bacteriology laboratories but also public health, virology and tuberculosis reference laboratories.

"Haematology and Serology" departments will include, in institutions where they occur, specialised sections such as blood coagulation and blood grouping and cross-matching laboratories which are commonly considered to be parts of such departments.

"Histopathology" departments are generally homogeneous in the institutions from which the survey population is drawn.

"Clinical Chemistry" departments will include, as well as routine diagnostic laboratories, paediatric and emergency biochemistry sections.

The "Blood Transfusion" department refers specifically to the regional laboratory of the National Blood Transfusion Service and does not include those sections of Haematology and Serology laboratories which are concerned with transfusion procedures in the District General Hospitals and in the teaching hospital group. The category of departments defined as "Other" include a number of departments generally centred in institutions operating outside the Health Service, in which the work is of a varied nature embracing techniques and procedures common to more than one of the major disciplines.

The relationship of employing departments to college courses is a complex one which requires some explanation. The basic and multi-disciplinary nature of both O.N.C. and O.N.D. courses is such that students follow the same college curriculum irrespective of the type of department in which they are employed or trained. The position is to a certain extent similar with H.N.C. and H.N.D. courses in that the college curriculum has a common core content which is studied by all students regardless of the type of department in which they are employed or trained, coupled with four specialist optional subjects, one of which the student elects to study according to the type of department in which he is employed or trained. In these courses, blood transfusion constitute a section of the Haematology and Serology optional subject and virology and public health bacteriology is included in the subject Medical Microbiology. Students pursuing H.N.C. or H.N.D. who are or who will be employed in "Other" departments study one of the four optional subjects chosen according to circumstance or choice.
For students attending the course leading to Special Examination for Fellowship of the I.M.L.T., the choice of specialist option subjects is, in principle, greater. At this level of study, Virology is quite distinct from Bacteriology and Blood Transfusion Techniques is similarly distinct from Haematology. However, the college at which

this survey was carried out does not offer courses in either Virology or in Blood Transfusion Techniques so that according to their employing departments, all Fellowship students within the survey population will be studying one of only four specialist option subjects - Bacteriology or Clinical Chemistry or Haematology or Histopathology.

Fig.4.11. shows the distribution of the survey population by employing department.
More than 75% of the population is distributed almost equally between three of the four major disciplines - Microbiology, Haematology and Serology, and Clinical Chemistry. The fourth major discipline, Histopathology, is represented by 12.2% of the survey population. 1.9% of the survey subjects are employed in Blood Transfusion and the remaining 7.0% are employed in 'Other' establishments.

No precise statistics are available on the national distribution of technicians by department. The only figures which may provide some indication of the national position are the numbers of students entering H.N.C. and H.N.D. examinations and Special Examination for Fellowship of the I.M.L.T.. This data is published in the Annual Report of the I.M.L.T. (1976) and is shown in Fig.4.12. set against the distribution by department, of the survey subjects. The fifteen subjects who were employed in departments classified in the survey as "Other" were not included in the categories presented in Fig.4.12. as the nature of their work was not known to fall clearly into any one of the four major disciplines.

The findings show that the numbers of survey subjects employed in

Fig.4.11.

Distribution of Students by Employing Department.

Employing Department	Frequency		
	f	%	0% 50% 100%
Blood Transfusion	4	1.9	▨
Clinical Chemistry	53	24.9	▨
Haematology and Serology	55	25.8	▨
Histology	26	12.2	▨
Microbiology	60	28.2	▨
'Other'	15	7.0	▨
Total - All Students	213	100	▨

Fig.4.12.

Distribution of Students by Employing Department against numbers of candidates in 1976 National Examinations.

Employing Department or Discipline		Frequency			
		n	f	%	0% 50% 100%
Clinical Chemistry	Nat.Exam.	2317	665	28.7	▨
	Survey	213	53	24.9	░
Haematology and Serology	Nat.Exam.	2317	734	31.6	▨
	Survey	213	59	27.7	░
Histology	Nat.Exam.	2317	284	12.3	▨
	Survey	213	26	12.2	░
Microbiology	Nat.Exam.	2317	634	27.3	▨
	Survey	213	60	28.1	░

Microbiology, Haematology and Serology and Clinical Chemistry departments are very similar, while the number of survey subjects employed in Histopathology departments is approximately half of the number employed in each of the other major departments.
These distributions compare closely with national distributions in the four main disciplines, as far as can be deduced from available data, so to this extent the survey population may be considered to be reliably representative of technicians in training in all main disciplines within medical laboratories.

Section 6. Previous Employment of the Survey Subjects in Other Occupations.

Fig.4.13. shows the distribution of the survey population in respect of those subjects who reported previous employment in occupations other than medical laboratory sciences. These other occupations are classified under four headings:

1. Occupations within the Health Service in which the employee is directly concerned and involved in the care of patients. This category would include nurses and paramedical workers such as radiographers, occupational therapists, E.C.G. technicians etc..

2. Occupations within the Health Service in which the Employee is not directly concerned or involved in the care of patients. This category would include clerical, administrative, domestic and other ancillary workers.

3. Occupations outside the Health Service in any type of laboratory. Technicians previously employed as laboratory technicians in schools, colleges, universities, pharmaceutical companies, Water Boards, and other industrial laboratories would be included in this category.

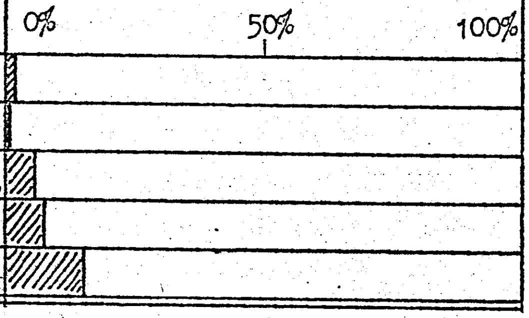
4. Occupations outside the Health Service other than in laboratories. All occupations other than those defined above would fall into this category.

Thirty four (16.0%) of the survey population were found to have had at least six months full time employment in some other occupation prior to entering medical laboratory sciences.

Fig.4.13.

Distribution of Students by Previous Employment in Other Occupations.

Type of Other Occupation		Frequency		
		f	%	0% 50% 100%
Health Service	Patient Care	3	1.4	
	Non-Patient Care	1	0.5	
Non-Health Service	Laboratory	13	6.1.	
	Non-Laboratory	17	8.0	
Total - All Students		34	16.0	



It can be seen that only four (1.9%) of the survey subjects were drawn from other occupations within the Health Service, three (1.4%) coming from jobs directly concerned with patient care and only one (0.5%) from a job not directly concerned with patient care.
The large majority of survey subjects who had worked in other occupations prior to entering the laboratory service appear to have been employed outside the Health Service, thirteen (6.1%) coming from laboratory-type occupations and seventeen coming from other types of work.

These findings indicate that only a small proportion of medical laboratory technicians are recruited after experience in other jobs, the great majority entering the career directly from some sphere of full time education.
Of those that do enter from other occupations, it would appear that most come from jobs outside the Health Service, almost equally from laboratory and non-laboratory type occupations. This may, in a small way, be a favourable reflection upon the relative degree of job satisfaction that may be found within Health Service occupations.

Chapter Five

Entry to the Career

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Introduction

The different levels at which recruits may, according to their academic qualifications, enter the career has been discussed in the previous chapter. It was shown that 179 (84%) of the survey subjects entered medical laboratory technology directly from secondary or tertiary full-time education, the remaining 34 (16%) coming from some other type of employment.

It seems likely that most recruits will have received some advice or guidance on the more important aspects of the career prior to entry and will almost certainly have had some pre-conceived ideas of the work they could expect to do as medical laboratory technicians.

A variety of factors may have influenced their choice of the institution within which to seek work and when they were employed, the realities of their work will have corresponded to varying degrees with their prior expectations. They will have found certain aspects of their work agreeable and other aspects less so. Contact with technicians employed in other departments of the laboratory or with those employed in other institutions will have provided them with a comparative basis for evaluation of their own particular positions and their knowledge of the jobs of their friends in other occupations will have given them an additional framework for evaluation.

In this chapter an attempt is made to examine the advice and guidance given to those who aspire to a career in medical laboratory technology in respect of the sources of information and advice which were consulted and the degree to which these sources were found to be helpful.

A measure of the effectiveness of these sources is sought by assessment of the extent to which the students' expectations of the job compared with their subsequent experience of it.

The factors which lead students to seek employment in particular

institutions are explored and their views of the attractive and the unattractive features of their working situations are examined.
The students' comparative assessment of their jobs set against the jobs of other medical laboratory technicians is evaluated and a similar comparison is made with respect to the jobs of their friends who are employed in other occupations.

Section 1. Career Guidance prior to Entry.

Unlike many other occupations, including most of those within the National Health Service, medical laboratory technology is practiced in a situation which is almost entirely isolated from the public view. As a consequence it may only be those who are directly involved in laboratory medicine that have first-hand knowledge of the work of a medical laboratory technician. The laity must generally depend for their knowledge on the modest literature published by the professional body and by employing authorities, or upon the questionable image of the job as portrayed in popular literature and other media.

Those who normally provide advice to school-leavers - parents, friends, teachers and career advisory officers - will almost invariably be in this latter category and will thus be unable to advise in depth or detail. Their advice may be supplemented by more authoritative and detailed information provided by potential employers, colleges which have staff with specialised experience, and professional advisors at school career conventions.

All these sources may, provided their advice is sought, give the prospective medical laboratory technician guidance in specific or in general terms: the value of such guidance will largely depend upon the extent and accuracy of the information provided as well as upon the experience and ability of the advisor in relation to the guidance of young people.

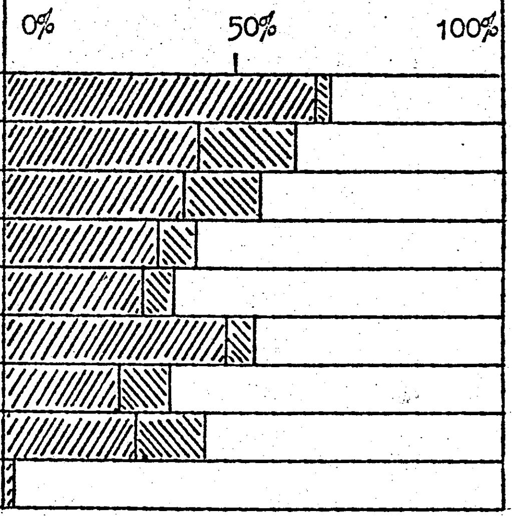
Fig.5.1. shows the extent to which the survey population received advice from identified potential sources of information. It also indicates the extent to which the advice received was felt by the recipients to be helpful or otherwise.

All the identified sources of guidance were consulted by a substantial proportion of the survey population and to this extent they would seem

Fig.5.1.

Distribution of the Students by their Sources of Career Guidance and their opinions of the Helpfulness of the Guidance received.

Guidance Sources	Frequency		
	%A	%B	%C
Parents and Relatives	69	95	5
Teachers	59	67	33
Youth Employment Officers	54	70	30
Friends	41	81	19
Employers	36	82	18
Books and Newspapers	52	87	13
Colleges	34	71	29
Career Conventions	41	64	36
Other Sources	2	100	0



A = ▨ = % of total population (213) who sought advice.

B = ▨ = % who found sought advice helpful.

C = ▧ = % who found sought advice unhelpful.

to fulfil a significant role in advising school-leavers intent upon a career in medical laboratory technology.
Parents and relatives were understandably the most commonly consulted sources, providing advice for 148 (69%) of the subjects. Teachers and youth employment officers gave advice to almost as many - 125 (59%) and 115 (54%) respectively. These advisors - parents and relatives, teachers and youth employment officers - would probably be seen by school-leavers as authoritative sources, and their advice would be readily accessible. For these reasons they might be expected to be the most commonly consulted sources.

Substantially fewer students reported receiving advice from potential employers (76 or 36%), and from colleges (73 or 34%). Although these sources could be expected to provide definitive and detailed information, its acquisition would require a specific initiative on the part of the student and it was probably for this reason that colleges and employers were consulted by fewer students than the more readily available sources.

Books and newspapers and the subjects' friends appear to have provided guidance for 110 (52%) and 88 (41%) of the students respectively. In viewing these relatively high values, for what in many cases may have been limited to only casual and fragmentary information, it should be noted that the subjects were not required to discriminate between sources in quantitative terms.

Career conventions, which are known to be organised regularly by the schools in the area from which most of the survey subjects will have been recruited, were used as a source of guidance by 87 (41%) of the students.

Only 4 (2%) of the survey subjects received guidance from sources other than those listed in the questionnaire. On examination of the students' description of these sources, it was found that they could in fact, be identified with one or another of the listed categories.

The extent of the helpfulness of the consulted sources of guidance is also shown in Fig.5.1. and predictably almost all (140 or 95%) of the subjects who received advice and guidance from parents or relatives reported that they found it to be helpful.

For the remaining listed sources, a substantial proportion of the students who received guidance - ranging from 64% in the case of career conventions to 87% in respect of guidance from books and newspapers, found it to be helpful.

These results show that on average, students made use of more than three of the listed sources of career guidance prior to their entry into medical laboratory technology and that these sources have a mean helpfulness of 80%. While it must be borne in mind that this question did not take into account the quantity or the absolute quality of the guidance received, it is nevertheless rather surprising that the advice of friends and information obtained from books or newspapers should be sought and be found to be helpful by such a large proportion of the survey subjects.

It may be considered somewhat disappointing that advice on this career, given by teachers and by youth employment officers was found to be helpful by less than 70% of the subjects who received it and eventually entered the career.

This finding may be seen as confirmation of the earlier proposition that the advice available from such sources is likely to be of insufficient depth and detail. As it is these advisors who are most accessible to school leavers and will thus be the most commonly consulted, an improvement in the extent and quality of these advisors' knowledge of the career could be notably beneficial to prospective medical laboratory technicians in the future.

The finding that only 41% of the survey subjects received advice by attending career conventions, and that only 64% of these found such advice helpful would seen to justify some investigation of the role of these events in relation to the recruitment of medical laboratory technicians.

Section 2. Job Expectations.

The degree to which the expectations of a recruit to a career corresponds to, or differs from the realities of the working situation must largely depend upon prior personal observation if the nature of the occupation is such that workers may be freely observed by the public, and by information provided vicariously by sources such as those discussed in the previous section of this chapter.

In the case of an essentially covert occupation such as medical laboratory technology, opportunity for personal observation will probably be limited to those few people who have had occasion to attend laboratories in the capacity of patients or to those for whom a visit has been arranged by a potential employer or as an extra-curricular activity at school or at college.

For many recruits to this career, such opportunities may not have arisen prior to entry to the career and they will therefore have been dependant upon information and impressions obtained from the sources previously discussed.

Fig.5.2. shows the extent to which the survey subjects' experience of work compared with their expectations of it with regard to certain identified features.

The findings indicate that very few students enter the career without some degree of appreciation of the true nature of the work. The large majority appear to have found their expectations substantially fulfilled and an appreciable number seem to have possessed a very accurate knowledge of the work they would eventually do.

Analysis of the responses to this question showed that the extent to which the subjects' experience of work compared with their expectations was not significantly related either to the college course which they were pursuing at the time of the survey, or to their qualifications upon entry to the career.

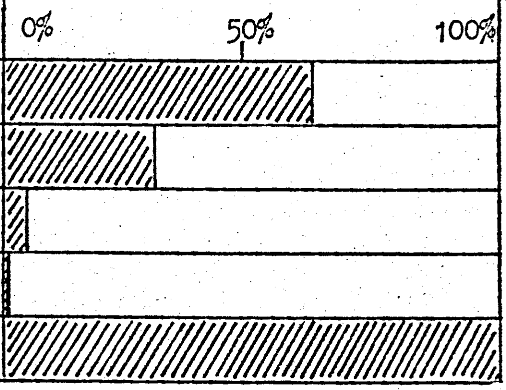
As described in Chapter 3. Section 7. pp.96, these and all other findings, significant and non-significant, were determined by the application of the chi-squared test to response distributions viewed against the respective explanatory variables.

A worked example of this procedure is illustrated in Appendix E.

Fig.5.2.

Distribution of the Students by their Views on the Extent to which their Experience of Work Compared with their Expectations

Extent to which Work Experience Compared with Expectations	Frequency	
	f	%
Exactly or Mostly as Expected	136	64
Somewhat as Expected	64	30
Not as Expected	11	5
Nil Response	2	1
Total - All Students	213	100



Section 3. Choice of Employing Institution.

Once commited to the idea of a career in medical laboratory technology, the school-leaver will probably be influenced by a variety of factors in his selection of a particular institution within which to seek employment.

For those who enter work directly after leaving school, the availability of a job at the right time will be an overriding factor. The great majority of young people who do come to the career directly from school appear to obtain jobs which allow them to live at home, so that geographical considerations will also constitute a major determinant in job choice.

Within the constraints created by these factors, school-leavers may be expected to take account of information, where it is available, concerning the conditions of work, promotion prospects, opportunities for further study and qualification, and similar considerations which will vary to some extent, even within the same occupation.

Fig.5.3. shows the distribution of day release students by the factors which governed their choice of employing institution for their first full-time job. This question was asked of the 155 survey subjects who were already in full-time employment.

The resposes show that the predominant factor which influenced 68 (43%) of these subjects was the availability of jobs in medical laboratories at the time when work was sought.

The remaining subjects' responses were fairly uniformly distributed between the other specified factors - the reputation of the institution as a good place to work (28 or 17%), the impression gained on a school visit (20 or 13%), and the closeness of the institution to the subjects' home (16 or 10%).

27 students (17%) specified "other" reasons in their responses to this

Fig.5.3.

Distribution of Day Release Students by the Factors which governed their Choice of Employing Institution.

Factors which Governed Students Choice	Frequency		
	f	%	0% 50% 100%
A good place to work	28	17.6	▨
Impressed on a school visit	20	12.6	▨
Within easy reach of home	16	10.1	▨
The only job available *	68	42.8	▨
Other reasons	27	16.9	▨
Total students	159	100	▨

* This refers to the only job available in a medical laboratory at the time a job was sought by the student.

question. On examination of these particular responses, it appeared that the question had been misunderstood, for of the 27 responses in this category, 24 gave reasons for entering the occupation rather than for seeking work in a particular institution. The three students who gave valid "other" reasons, explained that they had selected the institution because they had received agreeable and stimulating training there while pursuing the O.N.D. course. This does perhaps in a small way indicate one of the suggested advantages of sandwich courses.

Fig.5.4. shows the distribution of sandwich course students by the factors which would govern their choice of employing institution for their first full-time job.

This question, put to the 58 students attending the H.N.D. or O.N.D. courses, was of necessity phrased differently and offered a different choice framework than that put to day-release students, owing to their different circumstances.

For sandwich course students, the availability of jobs was a matter for the future and could not therefore rank, at the time of the survey, as a factor in their choice.

The majority of these sandwich course students (36 or 60%) cited the impression of the institution as a good place to work as the predominent factor which would influence them.

The prospects of promotion were rated by 13 (22%) of the subjects as the most important factor, while 7 students (11%) considered nearness to their home as the primary factor in their choice.

4 (7%) of the students specified "other" reasons in their answers to this question. On further examination it was found that all four were in effect stating that their choice would be governed by their regard for a particular institution as a good place to work. These responses should therefore be included with those of the majority who held this view.

There was evidence in the responses of both groups of students to the question concerning choice of employing institution, that a small proportion of the subjects had either misunderstood the question or had been confused by the response frame. This was apparent in the responses of most of those who completed the "other" reasons category, and also by the fact that two students who were in full-time employment answered the question aimed at sandwich course students, and four sandwich course students answered the question directed at day-release students who were in full-time employment.

The dissimilarity in the circumstances of the two groups of subjects identified in this section of the survey precludes any very close comparison to the two sets of responses. It may however be noted that a very similar proportion of the subjects in both groups cited "easy reach of home" as the most important factor in choosing an employing institution.

If the sandwich course students were to be re-surveyed after their entry to full-time employment, it seems very probable that they too, would tend to view the availability of jobs as the prime determinant of their choice of employing institution, at the expense of more qualitative considerations.

Fig.5.4.

Distribution of Sandwich Course Students by the Factors which governed their Choice of Employing Institution.

Factors which Governed Students Choice	Frequency		
	f	%	0% 50% 100%
A good place to work	36	60.0	▨
Within easy reach of home	7	11.6	▨
Good promotion prospects	13	21.7	▨
Other reasons	4	6.7	▨
Total Students	60	100	▨

Section 4. Conditions of Work.

The section of the questionnaire concerned with this topic posed three questions with a view to establishing a profile of the features and conditions of work which, in subjective and in comparative terms, contribute to making medical laboratory technology an attractive or an unattractive occupation.

The first question, seeking students' views upon the attractive and unattractive features of their present jobs, was in an open form. All the survey subjects recorded some response to this question. All but one of the subjects specified some attractive features of the job and 171 (80%) referred to various features which they considered to be unattractive.

Although responses were phrased in a wide variety of different ways, it was possible to identify a limited number of distinct views which could be grouped into three broad categories according to whether they referred to what might loosely descibed as "intellectual", "material" or "other" features of the job.

Fig.5.5. presents a summary of the responses categorised as described and indicating the frequency of response to each aspect which provoked comment.

In an open question of this sort it is predictable that elements of contradiction might appear in the responses, according to the respondents' attitudes and circumstances. Although this appeared to be the case with respect to some aspects of the job, certain broad trends of opinion stand out which, viewed overall, may be ascribed with some qualitative significance.

The findings presented in Fig.5.5. show clearly that the most notable attractive features of the job are the ones which are essentially intellectual - the interesting nature of the work, the pleasant and agreeable collegues, the variety of work activities, the freedom and responsibility enjoyed, the general level of job satisfaction. Numerically, the references to these attractive features seem to outweigh the comments upon unattractive features of the job, concerning boredom and the routine nature of the work, the attitudes and behaviour of senior staff, the pressure of work and the limitation of responsibility.

The net impression gained is that the intellectual aspects of the job are primary attractions for the large majority of the survey subjects.

References to the more material conditions of working conditions also comprised a major response area and here again, description of conditions of work and of facilities available, job security and career prospects, working hours and holiday allocation, education and training facilities, geographical convenience and social benefits, in attractive terms more than doubly outweigh references to these features as unattractive aspects of the job.

There remains a relatively small number of references to miscellaneous features, attractive and unattractive, which although they might have been classified within the previous two broad categories, were felt to be sufficiently exceptional to warrant separate listing. Those listed as attractions were few in number and might have been interpreted as intellectual features of the job. The unattractive features in this category comprise mainly of very specific objections to conditions which are probably uncommon in most other occupations and which may require careful consideration prior to entry to the career.

There were more than twice as many (413) references to specific attractive features of the job than there were to specific unattractive features (204).

Fig.5.5.

Students Views of the Attractive and Unattractive Features of their Job.

Attractive Features	f	%	Unattractive Features	f	%
Intellectual					
Interesting nature of work	102	48	Boredom and routine	64	30
Pleasant and agreeable collegues	62	29	Attitude and behaviour of collegues	25	12
Variety of work activities	52	25	Pressure of work	16	8
Job satisfaction	42	20			
Freedom and responsibility	36	17	Limitation of responsibility	7	3
	(294)			(112)	
Material					
Conditions and facilities	33	16	Conditions and facilities	9	4
Monetary rewards	31	15	Monetary rewards	21	10
Security and prospects	22	10	Prospects	6	3
Working hours and holidays	14	7	Inadequacy of training	8	4
Education and training	9	4	Need to study and qualify	10	5
Geographical convenience	6	3			
Social benefits	5	2			
	(120)			(54)	
Miscellaneous					
Contact with patients	11	5	Lack of patient contact	3	1
Prestige enjoyed	4	2	Poor status	3	1
Practical nature of work	2	1	Hazards of work	14	7
			Offensive duties	18	8
	(17)			(38)	
Total approving comments	431		Total disapproving comments	204	

Although these responses were not made in quantitative terms, the findings do strongly suggest that medical laboratory technicians are generally much more satisfied than discontented with the intellectual and material aspects of their jobs.

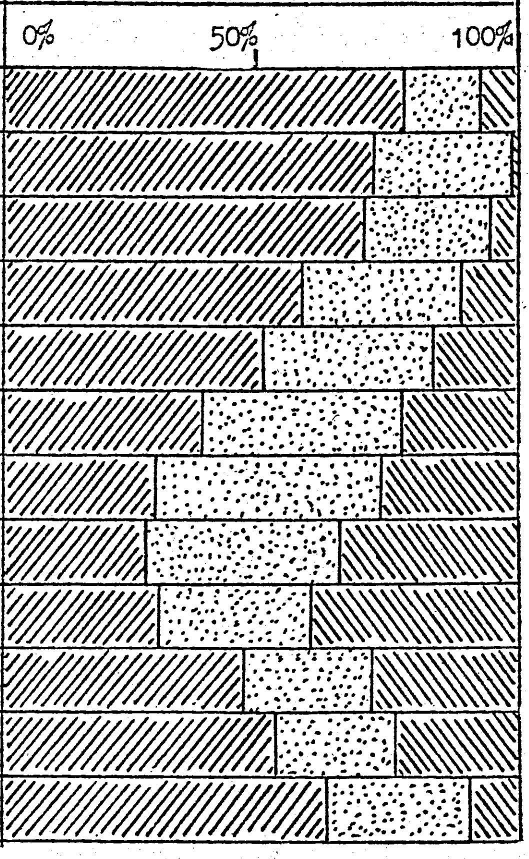
The second and third questions in the section of the questionnaire concerned with job conditions required the survey subjects to compare their jobs, with regard to certain specified features, with those of their friends in other occupations and also with the jobs of medical laboratory technicians employed in other laboratories..

Fig.5.6. presents the students' views of their working situations compared with those of their friends in other occupations.
The most notable finding here is that more than 80% of the survey subjects felt their jobs offered greater career opportunities than did the jobs of their friends. It also shows that the majority of the respondents consider their jobs to be superior to those of their friends in terms of prestige, security and intellectual stimulation: slightly more than half of the survey subjects also appear to believe that they enjoy better physical conditions in their work than do their friends.
A relatively neutral response was obtained with regard to the comparability of the social activities which they enjoyed and to the hours which they were required to work. There appears to be a slight tendancy towards the belief that they are subject to a more intense pressure of work than are their friends.
The question categories concerning salaries and position yielded response patterns which do not exhibit any notable trend of opinion in either direction. They do however merit some close examination.
Responses related to Present Salary and to Salary Scales as A Whole

Fig.5.6.

Students Comparison of their Working Situation with the Working Situations of their Friends in Other Occupations.

Features of the Job	Frequency			
	f	%A	%B	%C
Opportunities to improve qualifications	202	81	12	7
Security	202	74	25	1
Intellectual stimulation	199	72	22	6
Social prestige	195	58	30	12
Physical conditions of	198	51	31	18
Social stimulation and activities	195	38	38	24
Amount of work and working hours	202	32	41	27
Pressure of work	200	29	34	37
Present salary	190	33	28	39
Salary scale as a whole	186	47	20	33
Position as a whole including salary	195	54	23	23
Position as a whole excluding salary	195	63	26	11



% A = ▨ = percentage of respondents stating "better than friends job".

% B = ░ = " " " " "same as friends jobs".

% C = ▧ = " " " " "worse than friends jobs" showed a rather singular polarisation of opinion with 'better' and 'worse' responses each exceeding the nimber of 'same' responses. A possible explanation for this may be that the subjects' salary scales tend to cover a wider range than those of their friends so that by comparison, students in the more advanced courses and thus in the higher occupational gradings would enjoy rather better salaries, while their collegues in primary courses and thus at basal occupational gradings, would tend to be less well paid than their friends.

It is not uncommon to find in an occupation with a well-defined career structure and substantial opportunity for advancement, relatively low salaries in the early years, offset by more generous remuneration once qualifications and experience have been gained. Such a pattern might be quite noticeable when salary scales for medical laboratory technicians are viewed against those of jobs which offer less opportunity for advancement and a consequently more restricted salary scale.

Responses to the two question categories referring to occupational position show modest trends of opinion towards medical laboratory technology being considered superior to the jobs of the survey subjects' friends.

It would appear that the agreeable features of this career compensate, in the opinion of most of the subjects, for any disparity in salary at the early stages of the career.

The general impression obtained from the responses to this question is that the majority of medical laboratory technicians believe that as far as the more important aspects of their occupation are concerned, they enjoy at least as good, and in some cases better conditions of work than do their friends in other occupations.

Fig.5.7. presents the students' views of their working situations

compared with those of their collegues working in other medical laboratories.

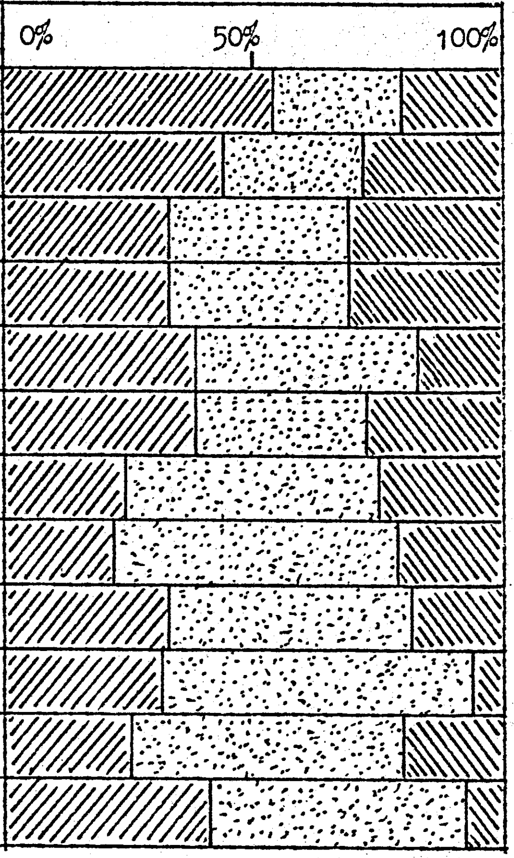
Responses concerning the majority of features listed in this question were essentially neutral, with a more or less normal distribution of response. Such findings are not surprising considering that the comparisons were made within the same occupation and relate to features which are characteristic of the job and are largely independant of location. This response pattern provides some reassurance that responses to the questions concerning job comparisons have some validity and are not wildly subjective.

The only exceptional responses to this question were those referring to Facilities and Equipment Available and to the Interest and Variety of Work Activity. For both these job characteristics there was a significant tendancy towards the respondents believing that they enjoyed better facilities and equipment, and greater interest and variety of work than did their collegues employed in other laboratories. These findings confirm the impression already obtained in responses to previous questions concerning conditions of work, that the survey subjects have a high regard for the importance and the quality of such features in their work.

Fig.5.7.

Students Comparison of their Working Situation with the Working Situations of their Friends Employed in Other Medical Laboratories.

Features of the Job	Frequency			
	f	%A	%B	%C
Interest and variety of work	182	54	26	20
Laboratory facilities and equipment	182	45	27	28
Intellectual stimulation	182	33	37	30
Social stimulation and activities	180	33	37	30
Discipline in the laboratory	179	38	46	16
Supervision and guidance	182	38	33	29
Pressure of work	179	23	51	26
Amount of work and working hours	182	21	57	22
Physical conditions of work	181	33	48	19
Worthwhileness of the work you do	179	31	63	6
Appreciation of your work by hosp. staff	172	25	55	20
General job satisfaction	180	40	51	9



%A = ▨ = percentage of respondents stating "better than other technicians' jobs

%B = ░ = " " " " "same as other technicians' jobs

%C = ▧ = " "c " " "worse than other technicians' jobs

Chapter Six

Membership of the Professional Body (I.M.L.S.)

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Introduction

Prior to the introduction of the National Certificate schemes in 1965, qualification at all levels in medical laboratory technology was normally dependant upon success in the examinations of the I.M.L.S., and the possession of I.M.L.S. membership at the appropriate grade and for a defined period was a prerequisite for entry to examinations.

Recruits with normal career aspirations were therefore obliged to seek membership of the I.M.L.S. shortly after entry to the career. The I.M.L.S. were thus assured of almost total membership of practising technicians at all grades. Continuity of membership was also assured by the need to retain qualifications in order to practise within the Health Service, for an appropriate grade of I.M.L.S. membership was a prerequisite for registration as a qualified practitioner.

The replacement of the I.M.L.T. Intermediate Examination by the O.N.C. in 1965 and of the I.M.L.T. Final Diploma by H.N.C. in 1967, effectively absolved technicians of the need to obtain I.M.L.S. membership for the purpose of gaining initial and State Registration qualifications.

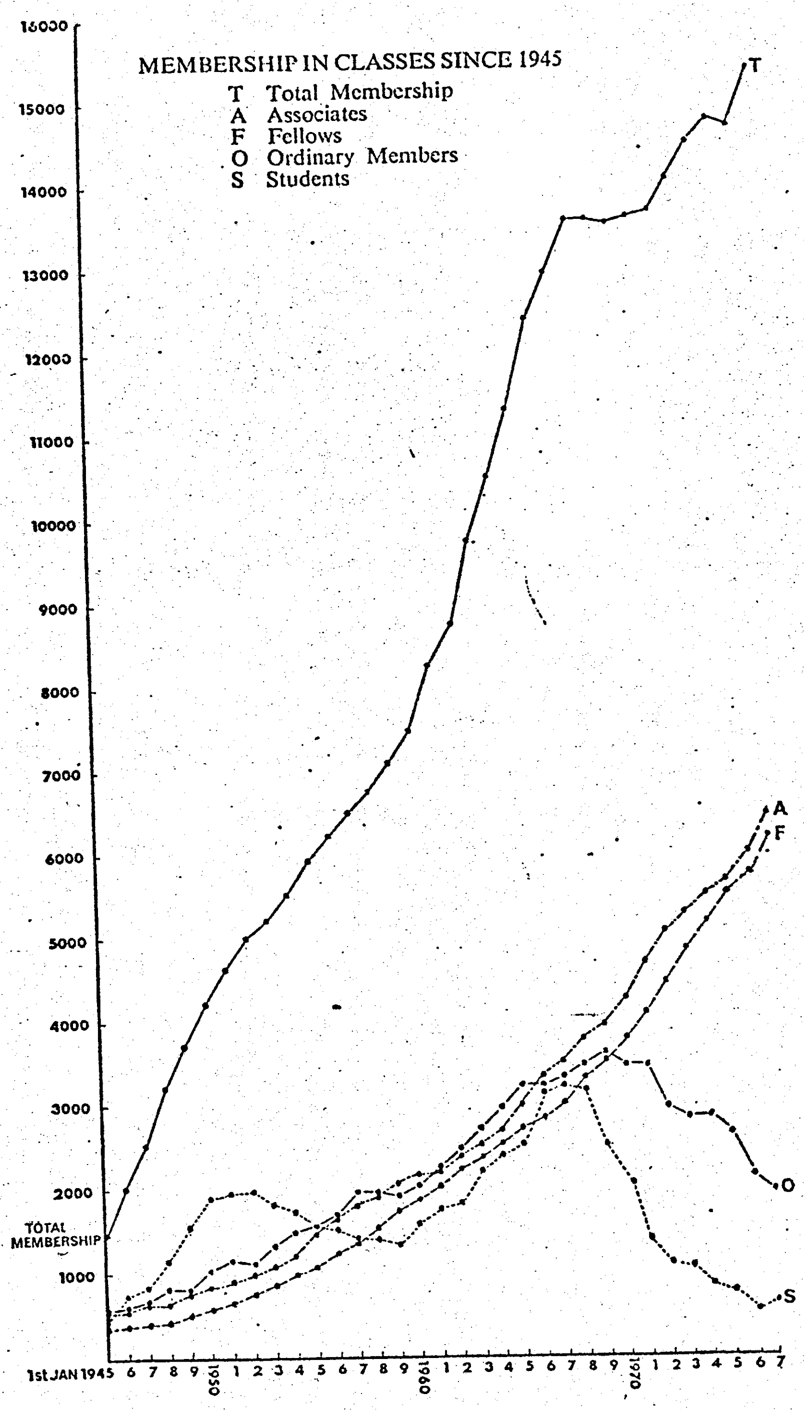
Entry to these new courses was dependant solely upon possession of appropriate academic qualifications, and entry to examinations and the gaining of awards required satisfactory attendance and attainment in approved courses of study. State Registration was attained by possession of of appropriate qualification - H.N.C. or H.N.D. or a science degree - together with a defined period of work in an approved laboratory.

The I.M.L.S. did however retain control of the most advanced qualification in the profession - Fellowship of the I.M.L.S. - for entry to examination for this award remained dependant upon I.M.L.S. membership, and retention of the qualification was subject to continued membership.

The consequences of these changes in terms of their effect upon I.M.L.S. membership can be seen in <u>Fig.6.1.</u> which illustrates the numbers of

Fig.6.1.

Membership of the I.M.L.S.



(Annual Report of The Institute of Medical Laboratory Sciences, 1976. Reproduced by kind permission.)

I.M.L.S. members at the various membership grades during the period 1945 - 1976.

The numbers of Student Members and Ordinary Members can be seen to have fallen dramatically at the time of the transition to the O.N.C. schemes, and they continued to fall up to 1976. The numbers of Associate Members and of Fellows of the I.M.L.S., who were committed to membership in order to attain or retain Fellowship qualification, show during the entire period, a continuing increase in numbers which parallels the increase in total membership.

In spite of the absence of any compulsion to acquire membership of the I.M.L.S. until a year prior to Fellowship Examination, it is clear from Fig.6.1. that some recruits do apply for and obtain Student and Ordinary grades of membership before this becomes essential for professional progress.

A variety of factors may influence the recruit in this direction. Senior laboratory staff, themselves members of the I.M.L.S., might be expected to encourage prompt acquisition of membership in the belief that this is in the interest of the recruit, the profession, and the public which it serves. Employers may similarly encourage recruits in the belief that this will promote a professionalism which will be reflected in the standard of the work carried out in the particular establishment. College lecturers, particularly those who are members of the I.M.L.S., may advise students to obtain membership because of the academic, professional and material advantages that they may believe accrue from this.

Other factors almost certainly play some part in determining when a newly-recruited technician seeks membership of the I.M.L.S.. The influence of the students' peers and also that of his parents might have a significant effect, as also will the intrinsic attitudes of the recruit himself.

The policy of the I.M.L.S. in relation to recruitment to membership, is to encourage its existing members, particularly those in senior positions, to bring to the attention of recruits the advantages of membership. Additionally it provides colleges with information on the conditions and benefits of membership so that they may be made known to students and prospective students.

The part of the survey concerned with I.M.L.S. membership seeks to determine the extent of student membership at different levels of qualification. It explores the influence upon this of the type of course to which the student is committed and also of the institutions and departments in which they work.

It assesses the encouragement which students are given to join the I.M.L.S. and examines the views of the students themselves upon the attractive and unattractive features of I.M.L.S. membership.

Section 1. The Distribution of Students holding I.M.L.S. Membership.

Of the two hundred and thirteen students in the survey population, 83 (39%) were members of the I.M.L.S. and constituted 0.9% of the total national population of members of comparable grades (Annual Report of the I.M.L.S.. 1976).

Fig.6.2. shows the distribution of students holding I.M.L.S. membership by the college courses they were attending, and also shows the grades of membership held by these groups..

Of the 53 students in the O.N.C. course, 8 (15%) were Student Members, while of the 29 students in the O.N.D. course, 3 (10%) held the same grade of membership.

12 (21%) of the 58 students attending the H.N.C. course and 16 (55%) of the 29 students attending the H.N.D. course were Ordinary Members of the I.M.L.S..

All forty four of the students pursuing the course leading to Fellowship were Associate Members of the I.M.L.S..

A number of features become apparent upon examination of these findings. The 100% membership of the I.M.L.S. shown by the students attending the Fellowship course is to be expected, as membership in the grade of Associate for a period of at least one year is a prerequisite for entry to Fellowship Examination.

As might also be expected, in view of the lack of necessity to acquire membership until one year prior to Fellowship Examination, only a proportion of all other students were members of the I.M.L.S.. In respect of these students in courses other than that leading to Fellowship, there is considerable variation in the frequency of I.M.L.S. membership.

The significance of this variation has been examined in relation to the level of course - Ordinary level as opposed to Higher level - and also in relation to the type of course - Certificate as opposed to Diploma.

Fig.6.2.

Distribution of Students with I.M.L.S. Membership by College Course and Membership Level

College Course and Membership Level		Frequency		
		n	f	%
O.N.C.	Student Member	53	8	15
O.N.D.		29	3	10
H.N.C.	Ordinary Member	58	12	21
H.N.D.		29	16	55
S.F.I.M.L.S.	Assoc. Member	44	44	100
Total Sample		213	83	39

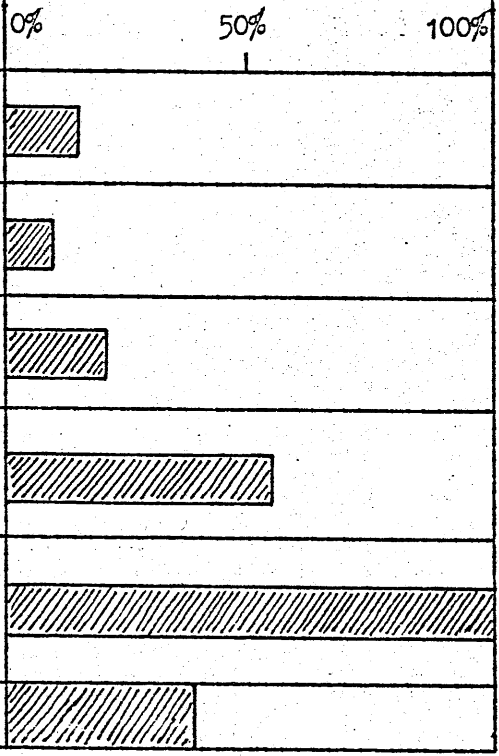


Fig.6.3.

Influence of Course Level (Ordinary or Higher) and of Course Type (Certificate or Diploma) on Distribution of Student Membership of the I.M.L.S.

Course Level/Type		Level of Significance	
		1% Level	5% Level
Level	O.N.C. v. H.N.C.	Not Sig.	Not Sig.
	O.N.D. v. H.N.D.	Sig.	Sig.
Type	O.N.C. v. O.N.D.	Not Sig.	Not Sig.
	H.N.C. v. H.N.D.	Sig.	Sig.

Fig.6.3. shows the results of tests of significance upon these variations. There is no significant difference in the frequencies of I.M.L.S., membership in respect of O.N.C. students as compared with H.N.C. students or of O.N.D. students as compared with H.N.D. students.

Frequency of I.M.L.S. membership among students of the H.N.D. course is however significantly greater than that of the H.N.C. course - a course of essentially the same level but of different type: it is also significantly greater than that of the O.N.D. course - a course of similar type but of a different level.

The structure of the H.N.D. course is such that students tend to receive attention from college staff and from senior laboratory staff which is greater in time, more continuous and more direct than is that that received by students attending O.N.D., O.N.C. and H.N.C. courses.

Fig.6.4. shows the distribution of students holding I.M.L.S. membership by employing department.

The number of students employed by individual institutions is in most cases too low to permit valid comparison of the frequencies of I.M.L.S. membership. If however, the frequency of membership among students employed collectively by the hospitals of the teaching group (55 or 46%) is compared with that of students employed collectively by the District General Hospitals (19 or 29%), a significant difference is obtained at the 5% level.

It would be easy to attribute this difference to a more positive influence exerted by the senior laboratory staff of the teaching group of hospitals and also to the more professional attitudes that might be claimed to prevail in these institutions: these may indeed be important factors. It must be remembered however, that the frequency of I.M.L.S. membership has been shown to be influenced also by the type and the level of the course to which the students are committed. It is possible

Fig.6.4.

Distribution of Students with I.M.L.S. Membership by Employing Institution.

Institution	Frequency			
	n	f	%	0% 50% 100%
Teaching Hospital Group				
Cardiff Royal Infirmary	19	10	53	
Llandough Hospital	13	3	23	
St.David's Hospital	12	1	8	
Sully Hospital	1	0	0	
University Hospital of Wales	74	41	55	
	(119)	(76)	(64)	
District General Hospitals				
Bridgend General Hospital	7	1	14	
Caerphilly Miners Hospital	3	3	100	
East Glamorgan Hospital	30	10	33	
Nevill Hall Hospital	2	0	0	
Royal Gwent Hospital	17	3	18	
St.Tydfil's Hospital	6	2	33	
	(65)	(30)	(46)	
Regional Blood Transfusion Centre	3	0	0	
'Other' Institutions	26	9	35	
Total - All Students	213	83	39	

that a higher proportion of the students employed by the teaching hospital group were pursuing the Fellowship course and these, as has been noted, will inevitably be I.M.L.S. members. This was in fact the case, but even when Fellowship students are discounted from the comparison, the difference in frequency remains significant at the 5% level.

It is known that students attending the H.N.D. course are trained exclusively in the laboratories of the teaching hospital group and the greater frequency of I.M.L.S. membership among these students has also been demonstrated in Figs.6.2. and 6.3.. This would also contribute to the higher frequency of membership among students of the teaching hospital group.

This feature does not however entirely mitigate against the proposition that students employed in the teaching hospital group receive more encouragement to seek membership of the I.M.L.S. than do students employed by the District General Hospitals. It may in fact contribute to proving the case.

In respect of the remaining institutions, no significance can be attached to the frequency of I.M.L.S. membership among students employed in the Regional Blood Transfusion Centre, owing to the very small number of students employed in that institution.

The "Other" institutions do however show a frequency only 4% lower than the mean frequency for all institutions concerned in the survey. This leads one to believe that factors other than those already referred to may encourage students to seek membership of the professional body. It may well be that a degree of professional isolation in relatively small, atypical laboratories promotes a desire for professional identification.

Fig.6.5. shows the distribution of students with I.M.L.S. membership by

Fig. 6.5.

Distribution of the Students with I.M.L.S. Membership by Employing Department.

Employing Department	Frequency			
	n	f	%	0% 50% 100%
Blood Transfusion	4	0	0	
Clinical Chemistry	53	24	46	▨
Haematology and Serology	55	24	44	▨
Histology	26	10	38	▨
Microbiology	60	19	32	▨
'Other' Departments	15	6	40	▨
Total - All Students	213	83	39	▨

employing department.

There appears to be no significant difference in the frequency of membership of students employed in the four major departments.

Here again, no significance can be attached to the findings relating to students employed in Blood Transfusion because of the small number of students involved.

Frequency of I.M.L.S. membership among students employed in "Other" departments are again closely comparable with the mean frequency for the entire survey population and contributes to the belief that employment in small, atypical establishments tends to provide, in one way or another, at least an average degree of encouragement to seek membership of the I.M.L.S.

Section 2. Encouragement to join the I.M.L.S.

It was suggested in the introduction to this chapter that the most likely sources of active encouragement for students to join the I.M.L.S. would include particularly those people - either in the employing laboratories or in the college - who are already members of the I.M.L.S.. This proposition may have already been partly substantiated in the first section of this chapter, by demonstrating that the employing institution and the college course to which the student is committed, are significant factors in relation to actual membership of the I.M.L.S.. This section analyses the relationship between the same experimental variables - employing institution, employing department, and college course - and the encouragement which students receive to join the I.M.L.S.

Of the entire survey sample of 213 students, 117 (55%) reported that they received encouragement to join the I.M.L.S.. The effectiveness of this encouragement may be gauged by comparison of this figure with the 83 (39%) students who actually held membership - and would thus appear to be effective for 71% of the students who did receive encouragement to join.

Clarke J.W.(1970) reported that in a population of students who were questioned about I.M.L.S. membership, 65% stated that they did not receive any encouragement to join. If it is assumed that the remainder of Clarke's survey population (35%) did receive encouragement from some quarter, the comparison of this finding with that of the present survey suggests that since 1970 there has been substantial increase in the amount or the effectiveness of the encouragement given.

Fig.6.6. Shows the distribution of students who received encouragement to join the I.M.L.S., by college course.

With the exception of students pursuing the H.N.D. course, these findings

Fig.6.6.

Distribution of Students encouraged to join the I.M.L.S.

by College Course.

College Course	Frequency			
	n	f	%	0% 50% 100%
O.N.C.	53	20	38	▨
O.N.D.	29	7	24	▨
H.N.C.	58	29	50	▨
H.N.D.	29	27	93	▨
S.F.I.M.L.S.	44	34	77	▨
Total - All Students	213	117	55	▨

show a progressive increase in the encouragement given, as students proceed from O.N.D. and O.N.C. through H.N.C. to the Fellowship course - predictably, as the necessity for I.M.L.S. membership approaches. Students in the H.N.D. course show a frequency of encouragement received which is notably greater than that for any other course - even the students of the Fellowship course for whom membership is a prerequisite for entry to the examination.

Comparison of the results shown in <u>Fig.6.6</u>. with those of <u>Fig.6.2</u>. which show the distribution of students actually holding I.M.L.S. membership by college course, is additionally revealing.

In respect of students in O.N.C., O.N.D. and H.N.C. courses, the percentage of students receiving encouragement who were actually members of the I.M.L.S. is relatively constant at 39 - 42%. This "encouragement efficiency" value is however 59% for students of the H.N.D. course and seems to indicate that as well as receiving more encouragement than other students, the encouragement which is received is notably more effective for H.N.D. students.

The same value for Fellowship course students cannot be considered owing to the obligatory nature of I.M.L.S. membership for this group.

<u>Fig.6.7</u>. shows the distribution of students who received encouragement to join the I.M.L.S., by employing institution.

As in the analysis in Section 1 of this chapter, of actual student membership of the I.M.L.S., the numbers of students employed in the individual institutions precluded valid comparison of frequency for individual institutions. If, as in Section 1, a collective comparison is made for the major groups of institutions, the frequency of encouragement received by students employed in the teaching group of hospitals (64%) significantly exceeds the frequency of encouragement received by students employed in the laboratories of the District General Hospitals (46%).

Fig.6.7.

Distribution of Students encouraged to join the I.M.L.S. by Employing Institution.

Institution	Frequency			
	n	f	%	0% 50% 100%
Teaching Hospital Group				
Cardiff Royal Infirmary	19	12	63	▨
Llandough Hospital	13	5	38	▨
St.David's Hospital	12	5	42	▨
Sully Hospital	1	0	0	
University Hospital of Wales	74	54	73	▨
	(119)	(76)	(64)	▨
District General Hospitals				
Bridgend General Hospital	7	0	0	
Caerphilly Miners Hospital	3	2	67	▨
East Glamorgan Hospital	30	15	50	▨
Nevill Hall Hospital	2	1	50	▨
Royal Gwent Hospital	17	10	59	▨
St.Tydfil's Hospital	6	2	33	▨
	(65)	(30)	(46)	▨
Regional Blood Transfusion Centre	3	0	0	
'Other' Institutions	26	11	42	▨
Total - All Students	213	117	55	▨

However, further examination of Fig.6.7. shows that this difference is due to the exceptionally high frequency of encouragement received by those employed specifically in the University Hospital of Wales, coupled with the proportion (62%) of students of the teaching hospital group which that institution's students represent.

The significant feature of this analysis is thus not so much the greater frequency of encouragement received by students employed in the teaching hospital group as compared with that for students employed by the District General Hospital, as the particularly high frequency recorded by students employed in the University Hospital of Wales.

Fig.6.8. shows the distribution of students who received encouragement to join the I.M.L.S., by employing department.

For the four major departments there is no significant difference at the 5% level, in the frequency of encouragement received by students.

The small number of students employed in Blood Transfusion precludes any comment on the frequency obtained for that department.

The frequency in "Other" departments, of students reporting encouragement to join the I.M.L.S is however significantly lower at the 5% level, than the mean frequency for the four other major departments.

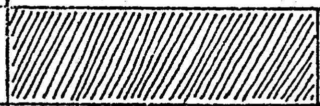
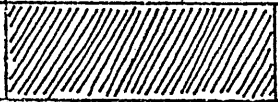
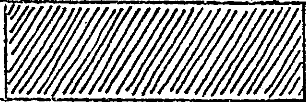
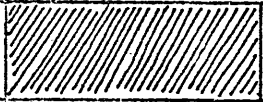
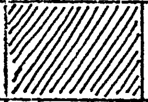
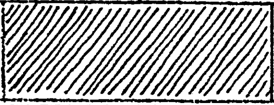
In terms of actual membership, it has been seen in Fig.6.5. that there is no significant difference in the frequency for students of "Other" departments as compared with the mean frequency for the students of the four major departments.

These seemingly conflicting findings - a 'normal' frequency of actual membership and a significantly low frequency of encouragement to join the I.M.L.S. - may be confirmation that students in "Other" departments seek membership of the I.M.L.S. as a result of individual initiative rather than as a result of active encouragement.

Fig. 6.8.

Distribution of Students encouraged to join the I.M.L.S.

by Employing Department.

Employing Department	Frequency			
	n	f	%	0% 50% 100%
Blood Transfusion	4	0	0	
Clinical Chemistry	53	35	64	
Haematology and Serology	55	30	55	
Histology	26	16	62	
Microbiology	60	32	53	
'Other' Departments	15	4	27	
Total - All Students	213	117	55	

Section 3. The Students' Views of I.M.L.S. Membership.

The section of the questionnaire concerned with membership of the I.M.L.S. concluded with an open question which sought the students' views upon features which made membership attractive or otherwise. It was felt that such a question, posed in an open form, would elicit an unrestricted response which would reveal the students' views more clearly than would closed, structured questions.

143 (67%) of the survey population responded to this question, referring to a variety of what they considered to be attractive and unattractive features of I.M.L.S. membership. A large proportion of the respondents cited more than one feature, often attractive and unattractive ones. Responses to the question were analysed by a coding based upon a simplified listing of all the features referred to in the responses.

Fig.6.9. shows the frequency of response in respect of each identifiable feature.

It can be seen that the information provided by I.M.L.S. publications was valued by a large proportion of the respondents. The possession of I.M.L.S. qualifications and professional representation were both seen as important attractive features by many of the students. Local activities, organised under the aegis of the I.M.L.S., were also specified as particular attractions.

Comments on these various attractive features were sometimes most perceptive, with many references to "status and professional recognition", "standards and standing" and "putting us on the map". One trusting individual confided "the I.M.L.S. looks after our interests although I have no evidence to support this", while another, an H.N.C. student, admitted with revealing impartiality "I don't know enough about it to comment fairly".

A number of responses to this part of the question exposed a variety of

Fig.6.9.

Coding Scheme and Responses to Open Question on the Attractive and Unattractive Features of I.M.L.S. Membership.

Features of Membership	Frequency		
	f	%	0% 50% 100%
Attractive Features			
Job information (Gazette)	43	20	
Scientific info. (Journal)	44	21	
Personal benefits	2	1	
Local activities	12	6	
Qualifications	39	18	
Representation	28	13	
Unattractive Features			
Cost/Benefits	49	23	
Restrictive policy	6	3	
Information/Communication	4	2	
Other features	3	1	
Nil Response	70	33	

misconception concerning the role and function of the I.M.L.S. as laid down in its Articles of Association (1975), by reference to its direct concern with "pay and conditions", "job security" and "wage demands".

For the latter part of the question concerning unattractive features of the I.M.L.S., the aspect which provoked the greatest number of responses was the cost and the cost-benefit of membership. Many students considered the subscription fees to be simply too high while several judged the fees to be excessive in relation to the benefits derived.

In a minority of responses, inadequacy of information and communication was a complaint, while for a few students, the existance of specific criteria for membership was seen as a restrictive policy.

The general impression gained from study of the responses to this part of the question was that students were unaware of many of the responsibilities and activities of the I.M.L.S.. Thus one student felt that "entry to the Fellowship examination was the only virtue of membership" while another was of the opinion that "apparently all the I.M.L.S. does is to set examinations and circulate a magazine".

These and similar views were echoed by a considerable number of students who were concerned over the cost-benefit aspects of membership.

What would probably be seen by the I.M.L.S. as depressingly negative views were expressed by students who admitted "I have no views on the I.M.L.S.; I have never been told anything about it and the only reason I would join was if I wanted to try the Fellowship Examination - and I don't", and further, "when I was encouraged to join, the only reason I was given was that it would avoid retrospective fees later".

Several students voiced objections commonly heard in criticism of many public bodies and organisations, using words such as "bureaucratic", "distant" and "officious". One student even hinted darkly of "infiltration of the I.M.L.S. by government bodies".

Chapter Seven

College Studies

Introduction

The quality of college provision for student study will be a major determinant upon which will depend their success in achieving formal academic qualifications. For vocationally orientated courses such as those designed for medical laboratory technicians, college provision will also have a substantial influence upon the development of specific manual and intellectual skills and also less easily defined attitudes which are of prime importance in their work.

This quality of provision for student study will be determined by a variety of factors which fall into three broad categories: the human resources in the form of teaching and non-teaching staff and the skills abilities and attitudes which they bring to bear upon their work; the material resources of the college in terms of accomodation equipment and facilities; the organisational effectiveness of the college in applying its human and material resources to the needs of the students.

This chapter attempts to study the views and opinions students have of some aspects of these main factors and by analysing their responses, identify any notable strengths or weaknesses in the provisions made for their studies.

Section 1 examines the preferences students have for particular modes of college attendance and explores their reasons for holding such preferences.

Section 2 investigates the students views on the machinery for the dissemination of information concerning their courses, examinations and qualifications and on the effectiveness and adequacy of this machinery.

Section 3 surveys student opinion of some aspects of the curriculum with respect to the time allocated to major subject areas, the teaching and learning activities which they encounter at college, and operational features of the curriculum which may have an important influence upon the students studies.

Section 4 attempts to assess the students views of the material facilities available at the college for the pursuit of their studies.

As in other chapters, the general approach within each section has been to describe the incidence or distribution of the student response and then to examine ways in which, and the extent to which it appears to be related to the primary variables.

Section 1. Courses and Attendance.

At the time the survey was conducted, courses for medical laboratory technicians in the United Kingdom fell into three categories: Day Release, in which students already in full time employment attend college on one day and evening each week throughout the academic year; Block Release, again catering for students in full time employment but arranged in blocks of from one to six weeks attendance at college; Sandwich Courses, which recruit students direct from school and comprise relatively long alternating periods of study at college and training in hospital laboratories.

These modes of college attendance are all alleged to have certain advantages and disadvantages for the colleges which operate them, for the employers whose personnel attend them and most important, for the students themselves.

Whether a student is able to exercise personal choice in the mode of attendance for a course of study will depend upon individual circumstances.

School-leavers with a preference for continued full time study on an O.N.D. or H.N.D. course may gain entry to these provided they have the necessary entry qualifications. Others who might wish to obtain full time employment on leaving school and study by attending a part time Day Release or Block Release course, may fail to obtain a job and if they are determined to enter this career, will be compelled to enter it via an O.N.D. or H.N.D. course.

Technicians already in employment are, in the great majority of cases likely to be committed to a particular mode of course attendance according to the type of course available in the locality or as a consequence of preferences exercised by employers with regard for laboratory staffing requirements and financial considerations, and also their opinions of the educational merits of available courses.

The small proportion of technicians who may be allowed some choice in the type of course which they attend will probably be influenced by a variety of factors which are likely to include the educational quality of the course in relation to their eventual qualification, and geographical circumstances which would affect travel and accomodation commitments and thus the financial liabilities involved. Personal preferences and circumstances might also have a notable influence upon some students in their choice of course or mode of attendance.

The distribution of the survey subjects by the courses they were attending at the time of survey has been described in Chapter Four (Fig.4.3.) and it should be noted that they were all committed to either Day Release or Sandwich courses. No courses arranged on a Block Release basis were operating at the time of survey in the college at which it was carried out.

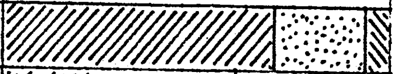
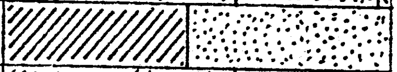
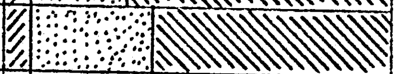
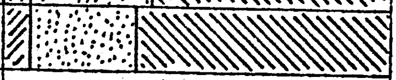
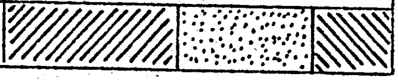
1(a). <u>Student preferences for different modes of college attendance</u>.

<u>Fig.7.1</u>. shows the students preferences for different modes of college attendance against the numbers of students who were actually attending courses in each mode.

The most obvious feature of these findings is that the majority of students in all courses except that for Special Fellowship of the I.M.L.S., show a preference - 58% on the case of Day Release students and 65% in the case of Sandwich course students - for the form of attendance which they were actually following. A majority of the students of the Fellowship course, and a significant minority of students of all other courses showed a preference for a form of attendance other than that which they were actually following.

Fig.7.1.

Distribution of students Preferred Mode of Course Attendance against their Actual Modes of Attendance.

Actual Mode of Attendance	Frequency				
	n	A%	B%	C%	0% 100%
Day Release Courses					
O.N.C.	51	71	23	6	
H.N.C.	57	60	37	3	
S.F.I.M.L.S.	43	47	53	0	
Total D/R students	151	60	53	3	
Sandwich Courses					
O.N.D.	28	7	25	68	
H.N.D.	29	7	31	62	
Total Sand. students	57	7	28	65	
Total - All Students	208	45	35	20	

A = ▨ = % students with preference for Day Release

B = ░ = % students with preference for Block Release

C = ▧ = % students with preference for Sandwich Course

There is no significant difference in the extent to which Day Release and Sandwich Course students held such preferences but there is a very consistent tendancy for these preferences to be for the intermediate attendance mode (Block Release,in terms of the length of periods spent at college), rather than for the more extreme modes - day release attendance in the case of Sandwich Course students and sandwich course attendance in the case of Day Release students.

Thus of the total survey population, 72 (35%) of the subjects stated a preference for the block release mode of attendance. This proportion was made up of 16 (28%) Sandwich Course students and 56 (37%) Day Release students. Of this last group, 23 students (41%) were pursuing the Fellowship Course and constituted 53% of the students in that course.

From these findings it would appear that a large proportion of the student population was essentially satisfied with the mode of attendance which they were actually following and from their point of view there would seem to be a case for the continued provision of the existing courses.

It would also appear that setting aside other controlling factors, there is a case for the provision of a block release mode, more particularly at the advanced levels where the student preferences for this mode become more pronounced and ultimately, in the Fellowship Course, a majority preference.

1(b) Students reasons for preferences for different modes of college attendance.

Of the 213 survey subjects, 208 (98%) gave reasons for stating a preference for a particular mode of college attendance.

A large proportion of the views expressed were presented at some length, many in a most articulate form, and there was a clear impression gained from the responses that this matter was one which the students considered important and upon which they had very definite views. Many students not only stated why they preferred a particular attendance mode but also cited objections to or shortcomings of other attendance modes.

Their preferences and objections were centred almost entirely on three considerations: the quality and effectiveness of provisions for study; the extent to which the mode of attendance permitted the co-ordination and relating of college studies and laboratory practice; the compatability of the respective attendance modes with the exigencies of the laboratory service.

(i) Day Release mode.

94 (44%) of the students expressed a preference for day release and argued variously that "it allowed more continuous integration and co-ordination of college studies and laboratory practice" and "maintained a constant stimulus and encouragement to study". It was also suggested that it provided an opportunity to "assimilate knowledge gradually" in " an uncrammed way" and "to see its practical significance every week"..

Day release was felt to bring "a welcome variety in the week's work" and to give "an opportunity to discuss college studies with other laboratory staff while it was still fresh in the mind." It was also noted that a week of illness meant the loss of only one day at college when a day release course was being followed.

Against these various advantages, a few students contended that day release attendance imposed a " lack of continuity on their studies" and " made it difficult to get into the swing of work at college". Several students commented that the " very long, tiring day" which this mode of study imposed, prevented them from obtaining the maximum benefit from their studies.

A small number of respondants also felt that day release courses were less well organised than other forms of attendance and that " study time was wasted" as a consequence.

Many of the subjects, particularly those who commended day release attendance, expressed a notable concern for the effect which college attendance had on laboratory staffing levels. In this context it was suggested that " one day each week interferes least with the work of the laboratory", that "the laboratory workload is evened out by day release attendance" and that " there is less disruption of the work of the laboratory".

(ii) Block Release mode.

Block release attendance was a stated preference for a surprisingly large number of students (Fig.7.1.), considering that none were actually attending a course in this mode. This was particularly notable in the responses of students pursuing the Fellowship Course, many of who thought that the " content and value of a block release course would be superior to that of day release" and " it would provide a deeper and more sound knowledge of the theory underlying practical work". Several argued that the greater concentration of study during block release would be more effective" and that " it is easier to learn and understand college work when attending on consecutive days for two or three weeks".

The most frequent arguments put forward against block release was the "staffing difficulties which it created in the laboratory" and that the "inevitable lull between blocks" encouraged discontinuity of study. A few students were concerned that attendance of block release courses would involve greater personal expense.

(iii) Sandwich Course mode.

Most of the 42 (19%) of students who were proponents of sandwich course attendance contended that it provided the " most effective integration of college studies and laboratory training. It was also thought that the greater time spent in college would " allow fuller and deeper study" and " better opportunity to sort out problems and difficulties".

The several students who felt that sandwich course attendance was undesirable argued that " it involved too long a break from the laboratory and that as a consequence of this " practical skills would be lost. It was also suggested that a period of more than two months at college would " prevent the close association of college study with laboratory practice" and would " lead to boredom".

Hostile responses were made by one or two students who indicated a general aversion to college study and a preference for uninterrupted work in the laboratory.

Section 2. Course Information.

Setting aside the quality of provision of teaching and study resources, it is inevitable that the adequacy and effectiveness of guidance and information on courses, examinations and qualifications contribute significantly to the ultimate success or failure of a student pursuing a particular course and an eventual qualification. Such guidance and information may have a very direct bearing on success where students need to be aware of certain essential criteria such as minimal attendance, homework and classwork requirements and examination entry conditions. Neglect or ignorance of such matters could certainly lead to failure in meeting qualification requirements. Adequate information and effective guidance on the content and structure of syllabuses, the interrelationship of subject areas, the mechanisms of assessment and the format of examination papers would also in an indirect way, almost certainly influence a student's eventual success by providing the proper perspectives for learning processes and examination performance.

The courses to which the survey subjects were committed are of considerable complexity in terms of structure, content, objectives and operational arrangements. Precise requirements are laid down for in-course assessment procedures and there is an elaborate pattern of formal examinations which lead to final qualification.

In the more advanced courses - H.N.C., H.N.D. and Fellowship of the I.M.L.S., students need also to be aware of the regulations and requirements relating to membership of the professional body and to Statutory Registration, with which they must comply in order to advance their career.

Guidance and information on these many important factors may be obtained from a variety of official and unofficial sources.

The prime sources are probably college staff who, according to their roles, might be expected to advise on all aspects of courses and qualifications, and also the senior staff of the laboratories in which the students work or are trained and who might be considered to have a degree of professional responsibility in this direction. Information pertaining particularly to the qualifications necessary for membership of the I.M.L.S. and to statutory registration is published from time to time in official publications. Finally, but perhaps not insignificantly, casual advice and information on these matters may be obtained from other students or from staff at the students' place of work or training.

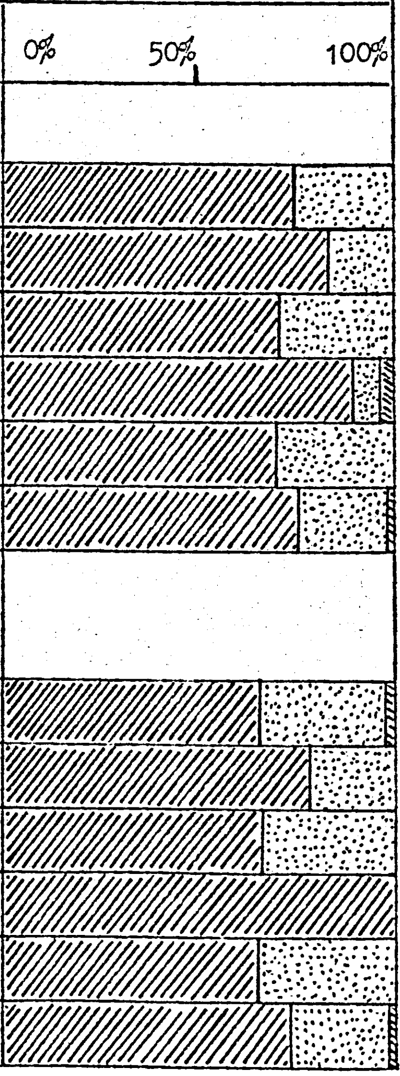
The students' views of the adequacy of their knowledge of, and availability of information on course arrangements and requirements and examination and qualification conditions and criteria, when viewed against the extent to which they consulted these various sources may provide some measure of their adequacy and effectiveness.

Fig.7.2. shows the distribution by college course, of student opinion of the adequacy of their knowledge of course arrangements and requirements and of the availability of information on these matters. It is clear from these findings that about threequarters of the total student population considered their knowledge of course arrangements and requirements to be adequate and a very similar proportion felt that information on courses was readily available. These results also show that compared with Day Release students (O.N.C.,H.N.C. and Fellowship), a significantly greater proportion of Sandwich Course students (O.N.D. and H.N.D.) believed their knowledge to be adequate and information to be readily available.

Fig.7.2.

Adequacy of the Students Knowledge of Course Arrangements and the Availability of Course Information

Knowledge and Availability by Course	Frequency			
	n	A%	B%	C%
Knowledge of Course Arr.				
O.N.C.	53	75	25	0
O.N.D.	29	83	17	0
H.N.C.	58	71	29	0
H.N.D.	29	90	7	3
S.F.I.M.L.S.	44	70	30	0
Total - All Students	213	76	23	1
Availablility of Course Info.				
O.N.C.	53	66	32	2
O.N.D.	29	79	21	0
H.N.C.	58	67	33	0
H.N.D.	29	100	0	0
S.F.I.M.L.S.	44	66	34	0
Total - All Students	213	73	26	1



A = ▨ = % students stating Knowledge Adequate/Info.readily Av.

B = ░ = % students stating Knowledge Inadequ./Info.difficult to obtain

C = ▧ = Nil response

Fig.7.3. shows the distribution by college course, of student opinion of the adequacy of their knowledge of examination and qualification conditions and criteria and of the availability of information on these matters.

Here again, almost threequarters of the total student population considered their knowledge to be adequate and information to be readily available, but unlike the findings concerning course arrangements and requirements, the responses of Sandwich Course students do not differ significantly from those of the Day Release students.

Fig.7.4. shows the distribution of the students by the sources of information on courses and on examinations and qualifications, which they most readily consulted.

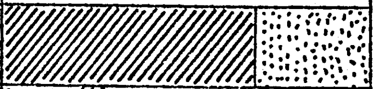
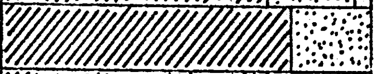
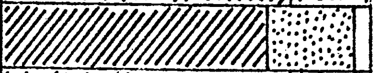
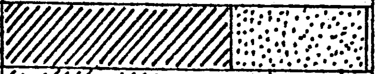
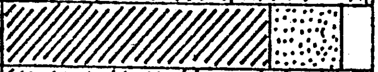
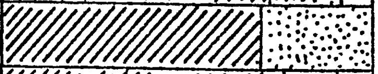
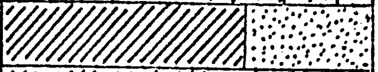
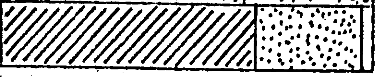
From the findings on both these information areas, it is apparent that course tutors and subject lecturers are jointly the most predominent sources, and provide a consistently high proportion of students of all courses with information of this sort. This is a predictable finding as these college staff are likely to be the authoritative sources with which students have most frequent and close contact.

It also appears that Sandwich Course students (H.N.D. and O.N.D.) are significantly more dependant on course tutors and less on subject tutors than are Day Release students (O.N.C., H.N.C. and Fellowship). The explanation for this difference is almost certainly that Sandwich Course students, during long, continuous periods in college, have a greater opportunity to consult their course tutor, who in some cases do not actually teach all the students for whom they have tutorship responsibilities.

This possible advantage of the sandwich course mode of attendance

Fig 7.3.

Adequacy of the Students Knowledge of Examination and of Qualification Conditions and Criteria and the Availability of Information on these matters

Knowledge and Availability by Course	Frequency				
	n	A%	B%	C%	0% 50% 100%
Knowledge of Exam./Qualif. Conditions and Criteria					
O.N.C.	53	66	34	0	
O.N.D.	29	72	24	4	
H.N.C.	58	78	22	0	
H.N.D.	29	72	24	4	
S.F.I.M.L.S.	44	80	20	0	
Total - All Students	213	74	25	1	
Availability of Exam./Qual. Information					
O.N.C.	53	62	36	2	
O.N.D.	29	72	20	8	
H.N.C.	58	69	31	0	
H.N.D.	29	76	14	10	
S.F.I.M.L.S.	44	66	34	0	
Total - All Students	213	68	29	3	

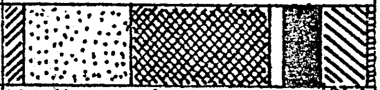
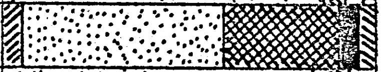
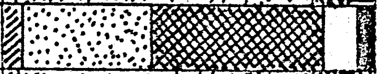
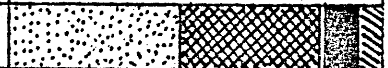
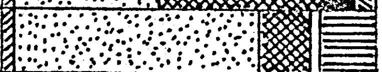
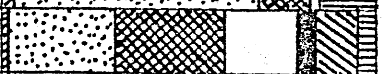
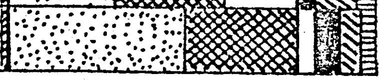
A = ▨ = % students stating Knowledge Adequate /Info.Readily Av.

B = ▒ = % students stating Knowledge Inadeq./Info.difficult to obtain

C = ☐ = Nil response

Fig.7.4.

Distribution of Students by the Sources of Information on Courses and on Examinations and Qualifications which they most readily consult against the courses which they were attending

Type of Information and Course	Frequency								
	n	%A	%B	%C	%D	%E	%F	%G	
Course info.									
O.N.C.	53	6	28	38	4	9	13	2	
O.N.D.	29	0	86	7	3	0	0	4	
H.N.C.	58	5	54	31	0	5	5	0	
H.N.D.	29	0	83	10	0	0	0	7	
S.F.I.M.L.S.	44	5	36	45	9	5	0	0	
Total	213	4	52	30	3	5	5	1	
Exam. and Qualif. info.									
O.N.C.	53	0	47	36	2	8	7	0	
O.N.D.	29	0	76	7	3	3	0	11	
H.N.C.	58	3	40	43	0	9	5	0	
H.N.D.	29	3	66	14	3	0	0	14	
S.F.I.M.L.S.	44	2	32	27	18	5	11	5	
Total	213	2	48	29	5	6	6	4	

%A= ▨ = % students citing H.O.D..

%B= ░ = % " " Course Tutor.

%C= ▩ = % " " Subject Lect.

%D= □ = % " " Official Publications.

%E= ■ = % Students citing other students

%F= ▧ = % students citing people at work

%G= ▤ = % Nil response

was in fact implied by a small number of students in stating their reasons for their preferences for particular modes of attendance, discussed in the first section of this chapter.

The extent to which students consulted the remaining listed sources of information was small in respect of every course except that leading to Fellowship of the I.M.L.S., where a significant proportion of the students reported consulting other students, people at work and particularly, official publications.

This exception is almost certainly a consequence of the external nature of the Fellowship Examination, conditions and arrangements for which are determined and publicised by the I.M.L.S..

Fig.7.5. shows the extent of the response to appeals by students for information on course arrangements and requirements and on examination and qualification criteria, against the courses which they were attending.

With regard to both areas of information, more than half of the survey population appear to have received ample, immediate help and almost all the remainder received some limited help.

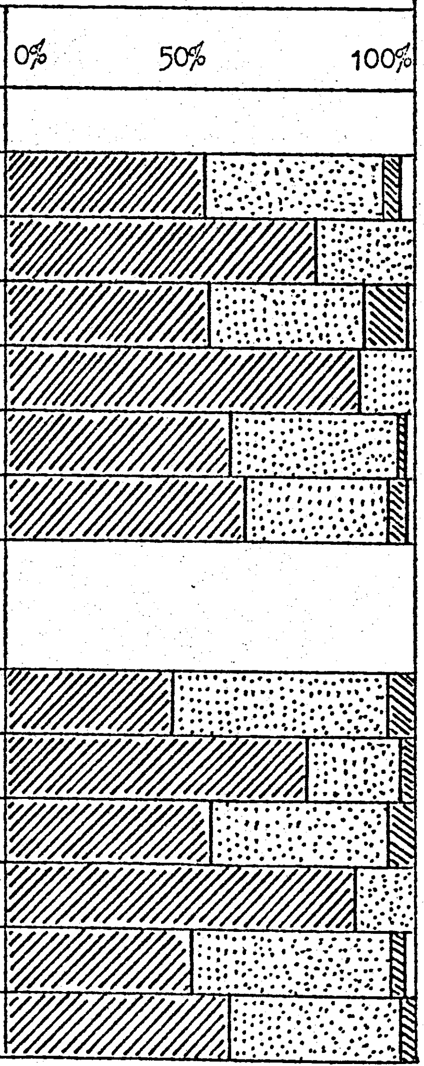
Ample help was however received by a significantly greater proportion of Sandwich Course students than of Day Release students, this difference being consistent throughout the two course types for both areas of information.

These findings indicate that very few students fail to receive some help when they seek information on courses, examinations and qualifications, and taking account of the findings presented in Fig.7.3. which indicate that almost all students see subject lecturers or course tutors as their primary sources of information, suggests that college teaching staff are generally forthcoming with information and advice of this sort.

Fig.7.5.

Extent of the Response to Appeals by Students for Information on Course Arrangements and Requirements and on Examination and Qualification Conditions and Criteria, against the courses which they were attending.

Type of Information and Course	Frequency				
	n	%A	%B	%C	%D
Course Arr. and Req.					
O.N.C.	48	48	44	4	4
O.N.D.	27	78	22	0	0
H.N.C.	53	49	38	11	2
H.N.D.	28	86	14	0	0
S.F.I.M.L.S.	44	55	41	2	2
Total	200	59	35	4	2
Exam. and Qualif. Conditions and Crit.					
O.N.C.	49	39	55	6	0
O.N.D.	25	76	20	4	0
H.N.C.	54	50	44	6	0
H.N.D.	26	85	15	0	0
S.F.I.M.L.S.	42	45	50	3	2
Total	196	54	41	4	0



%A = ▨ = % students who received immediate help

%B = ░ = % students who received limited help

%C = ▧ = % students directed elsewhere

%D = ☐ = % students finding little concern.

The significantly greater level of helpfulness shown to be recieved by Sandwich Course students would seem to reinforce the proposition made in discussion of the findings shown in <u>Fig.7.2</u>. that these students have a greater opportunity to obtain information from college staff than do Day Release students.

In the open question which concluded the section of the Questionnaire concerned with course information, 107 (50%) of the survey subjects responded with comments on course arrangements and requirements while 75 (35%) made comment on examination and qualification conditions and criteria. In both these areas the most frequent response was one of moderate satisfaction with comments such as "reasonable", "fair", "agreeable", "adequate" and "O.K." occurring repeatedly.

In addition to such broad comment, respondents referred, mostly in very specific terms, to a variety of aspects of their courses, examinations and qualifications.

In respect of course arrangements and requirements, the predominant concern appeared to be for the content of courses with particular emphasis on the relevance of subject material to the students' work 27 students (13%) questioned the "emphasis on irrelevant subjects" and "the limited association of study material with their work" and argued that much of their study "had little to do with their work". 10 students (5%) considered the General Studies component of their courses superfluous while several others felt that the science content of courses was not properly attuned to the needs of entrants to the profession who possessed 'A' level and degree qualifications.

Teaching methods were criticised in various ways by 29 (14%)of the

survey subjects, the most frequent complaint being that "related subjects were insufficiently linked" and that "basis science and specialist option subjects were poorly associated".
A few students held that "lecturers should stick more closely to their programme" while one or two thought that "lecture material was inadequate" and that "practical work was out of date and was also insufficient".
Three students pleaded for more tutorial guidance and the same number argued that they were required to do too many projects.

Of the 14 students (7%) who commented on the conditions or criteria for entry to and pursuit of courses, 10 (5%) complained that their study at college was "too long" or "too intense" while the remainder appeared to object to compulsory attendance .

Eleven (5%) of the students critisised the organisation of courses, eight of these referring to it in a general way as "poor". Two students expressed dissatisfaction over the delay in the publication of examination results while one felt that practical facilities were badly organised.

Provision of information on courses was a cause for concern for four students who pleaded for " more information at the beginning of the course", for "information in leaflet form" and for "clear guidance on the syllabus". One student considered that "the college was not fully aware of I.M.L.S. requirements".

There were fewer comments concerning examination and qualification conditions and criteria. Most (12 or 6%) questioned details of examination arrangements, arguing that "practical examinations were of little value","sessional examinations were superfluous", that "classwork marks should not count towards final awards" and "that there was too much emphasis on examinations".

Nine students (4%) were anxious about the value of the qualifications which they were pursuing, suggesting that "O.N.D. was of limited value for the purpose of university entrance", that there was "poor public regard for Fellowship qualification of the I.M.L.S." and that "it was not a guarantee of senior posts".

Nine students (4%) also felt that information about examinations and qualifications was inadequate and suggested that "more information should be provided on enrolment", "examination dates should be made known to students earlier" and that "access to past examination papers" and more guidance on project work" would be helpful.

Examination entry requirements received comment from five students who felt that the present requirements were "good" and "high - as they should be".

Section 3. Curriculum.

Any attempt to evaluate curricula of students pursuing courses which differ considerably in content, academic level or mode of operation must obviously be a limited one.

Teaching and learning activities appropriate to relatively mature Fellowship students, almost all of whom already have specialised qualification and experience, may be unsuitable for unqualified and inexperienced O.N.C. students.

Sandwich Course students, who have less opportunity to develop practical skills in a work situation, are likely to need greater attention in this area than are Day Release students who are able to develop and practice their skills in the normal course of their work.

Students of advanced courses are likely to find a greater need for specialised library facilities than are those attending non-advanced courses.

The more academic science studies may well have more appeal to students holding G.C.E. 'A' Level or degree qualifications while students who pursued vocational qualifications following G.C.E. 'O' Level may be more attracted by the applied specialist subjects.

It is against such factors as these that this section attempts to examine some of the more important curricular features in terms of the extent to which students feel them important, appropriate or effective.

Certain of the features investigated are rigidly prescribed by examining bodies, others are determined by college policy or local circumstances, while a number are within the choice framework of individual teachers.

To begin with, an assessment is made of student opinion of the time allocated to main study areas. This is followed by investigation of the extent to which the main structured teaching and learning activities are employed in the various courses and analysis of student opinion of the helpfulness of these activities and the adequacy of the time allocated to each of them.

Student views of the importance and of the actual provision of a number of detailed features of teaching and learning activities in examinable subject areas are analysed and a summary is made of student comment on these activities.

Finally, student appraisal of some of the more important material facilities provided for their studies is examined and their open comments on these facilities are described.

(a) Time allocation to the main subject areas.

In all the courses with which this survey is concerned, two main subject areas are clearly identifiable; one is supportive science, described variously as Basic Sciences in O.N.C. and O.N.D. courses, Medical Laboratory Sciences in H.N.C. and H.N.D. courses and Biomedical Sciences in the course leading to Fellowship of the I.M.L.S.; the other comprises the specialised, applied subjects, described as Medical Laboratory Sciences in O.N.C. and O.N.D. courses and as Haematology and Serology, Clinical Chemistry, Medical Microbiology and Histopathology in H.N.C., H.N.D., and very similarly in the course leading to Fellowship of the I.M.L.S..

All courses except the last mentioned also contain a third obligatory component of 'general' or 'liberal' studies, which is essentially non-vocational and concerned primarily with the development of the students broader education.

The Joint Committees responsible for Ordinary and Higher National Certificate and Diploma courses stipulate that about 60% of study time is devoted to supportive sciences, about 30% to the specialised applied subjects and about 10% to the general studies component.

Time allocation within the Fellowship course is determined by the college, subject to the approval of the I.M.L.S. and at the time of survey comprised 60% specialised applied subjects and 40% Biomedical Sciences.

Fig.7.6. illustrates the time allocation to the two main subject areas and the terminology used to describe them in the five courses with which the survey is concerned.

Fig.7.7. shows the distribution of student opinion of the time allocated to the main subject areas by course type - Sandwich course or Day Release course.

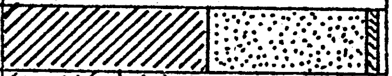
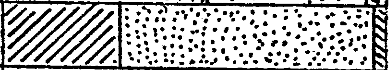
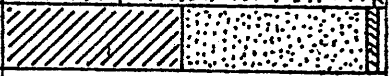
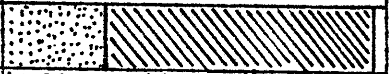
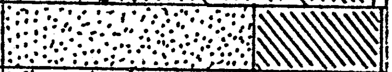
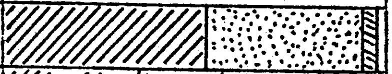
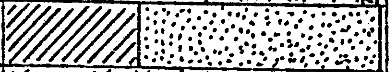
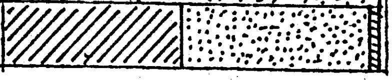
Fig.7.6.

Statutory Time Allocation to the Two Main Subject Areas and Terminology used to describe these Subject Areas

Course	Supportive Sciences	Specialised Applied Subjects	General Studies
O.N.C. and O.N.D.	Basic Sciences	Medical Laboratory Sciences	General Studies
% Total Time	60%	30%	10%
H.N.C. and H.N.D.	Medical Laboratory Sciences	Clinical Chemistry or Haematology and Serology or Histopathology or Medical Microbiol.	General Studies
% Total Time	60%	30%	10%
Fellowship of the I.M.L.S.	Biomedical Sciences	Clinical Chemistry or Haematology or Histopathology or Bacteriology	Nil
% Total Time	40%	60%	0%

Fig.7.7.

Student Opinion of the Time Allocated to Main Subject Areas against Course Type.

Main Study Areas by Course Type	Frequency					
	n	%A	%B	%C	%D	0% 50% 100%
Supportive Sciences						
Day Release Students	155	54	41	3	2	
Sandwich Students	58	31	66	3	0	
Total - All Students	213	47	48	3	2	
Specialist Subjects						
Day Release Students	155	0	22	75	3	
Sandwich Students	58	0	66	33	1	
Total - All Students	213	0	34	63	3	
General Studies						
* Day Release Students	111	53	41	3	3	
Sandwich Students	58	36	62	0	2	
* Total - All Students	169	47	49	2	2	

A = ▨ = % respondents stating 'Too Much'

B = ░ = % respondents stating 'About Right'

C = ▧ =% respondents stating 'Not Enough'

E = ☐ =% Nil Response

* figures exclude students attending Fellowship Course.

Because General Studies is not included as a main subject area in the curriculum of the Fellowship course, responses of students pursuing that course have been excluded from the analysis of the responses relating to that subject area.

With regard to the time allocated to supportive sciences study, the great majority of opinion was almost equally distributed between the belief that it was 'Too Much' and 'About Right'. Only six (3%) of the respondents considered that the time allocation to supportive sciences was insufficient.

While the majority of Day Release students believed that the time allocated to supportive sciences was 'Too much', a majority of Sandwich Course students were of the opinion that the time allocation was 'About right' and this difference is statistically significant. It would seem that almost half (47%) of all the survey subjects are of the opinion that excessive time is allocated to supportive sciences and that this belief is significantly more predominant among Day Release students than among Sandwich Course students.

135 (63%) of the survey subjects expressed the opinion that there was insufficient time allocated to specialised applied studies, while 72 (34%) believed that the time allocation to this subject area was 'About Right'. No students held the view that excessive time was devoted to it.

While 116 (75%) of the Day Release students thought that not enough time was allocated to these subjects, only 19 (33%) of the Sandwich Course students were of the same opinion. This difference is significant and suggests that while most students would wish to see more time devoted to this area of study, the great majority of these are Day Release students.

As in the case of supportive science studies, the opinion of students on the allocation of time to General Studies was almost equally divided between the belief that it was 'Too Much'(47%) and that it was 'About Right' (49%). Only three students (2%) felt that the time devoted to this subject was insufficient.

Yet again, when comparing the distribution of opinion of Day Release students with that of Sandwich Course student opinion, there is a significant difference with the majority of Day Release students (53%) believing time allocation to be 'Too Much', and a majority of Sandwich Course students (62%) considering the allocation to be 'About Right'.

While almost half (47%) of all students committed to General Studies felt that the time allocation to this subject area was excessive, 74% of these were students attending Day Release courses.

(b) Teaching and Learning Activities.

The variety of teaching and learning activities employed, and the extent to which each is used, will almost certainly vary from course to course according to whether they occupy a formal position in the curriculum and also depending upon preferences which individual teachers have for particular teaching techniques.

Thus formal lectures constitute a major part of all courses for medical laboratory technicians while a substantial number of practical exercises will be carried out by students of all these courses except those leading to Fellowship of the I.M.L.S..

Practical project work is invariably undertaken by students pursuing H.N.C. and H.N.D. courses and may form part of the study programme of some Fellowship students but will not be found in the curriculae of O.N.C. and O.N.D. students.

Demonstration, seminar and discussion techniques are likely to be variably employed according to the preferred methods of each lecturer. Their usage will also almost certainly be influenced by the level of the particular course, demonstration probably being particularly appropriate to the lower level courses where students have limited practical skills and experience, and less so in the more advanced courses where students already have considerable practical ability.

Apart from these considerations, the use of some teaching methods is inevitably dependant upon local resources. Specialist visiting lecturers may or may not be available, and the financial means of recruiting them may be limited so that they can only be employed in courses where their contribution is particularly appropriate and necessary.

Visits to specialised laboratories will be feasible only where suitable laboratories are available and are prepared to accomodate such visits and provided student numbers are not prohibitively large.

Fig.7.8. shows the percentage of the total student population that encountered each of the nine specified teaching and learning activities and also the percentage of students of each course who reported that they had encountered each particular activity.
All the activities listed appear to have been experienced by more than 30% of the survey population and to this extent, all may be said to have a significant place in the curricula of courses for medical laboratory technicians.
In terms of frequency of encounter, the activities listed appear to fall into three broad groups: the first, comprising lectures, homework and practical exercises, would seem to have been experienced by almost all the survey subjects. These findings are perhaps predictable as formal lectures are known to occupy at least 50% of the study time of each course, homework is a statutory feature of all courses prescribed by examining bodies or college regulations, and all courses except that leading to Fellowship of the I.M.L.S. are required to have substantial practical elements.
From the findings presented in Fig.7.8. it is apparent that the thirteen (6%) of the survey subjects who seemingly had not encountered homework comprised a small percentage of students in all courses except H.N.D.. Little significance can be attached to this finding.
Fig.7.8. also shows that the twenty eight (13%) of subjects who had apparently not encountered practical exercises were almost all attending the Fellowship course which does not have an obligatory practical component. Virtually all students attending all other courses had encountered practical exercises.

Fig.7.8.

Extent to which specified Teaching and Learning Activities were Encountered by the total student population and by the student population of each course.

Teaching/Learning Activity	Frequency						
	%A	%B	%C	%D	%E	%F	%A 0% 50% 100%
Lectures	100	98	100	98	100	100	▨
Homework	94	98	93	91	100	89	▨
Prac. Exercises	87	98	90	98	97	50	▨
Demonstration	60	60	72	53	90	39	▨
Discussion	54	55	31	31	55	100	▨
Prac. Projects	49	20	17	52	69	86	▨
Visits to Labs.	36	8	38	29	45	73	▨
Visiting Lecturers	33	6	24	19	24	98	▨
Seminars	31	13	17	10	28	91	▨

%A = ▨ = % of total population encountering specified activity

%B = % of O.N.C. students " " " "

%C = % of O.N.D. " " " "

%D = % of H.N.C. " " " "

%E = % of H.N.D. " " " "

%F = % of S.F.I.M.L.S. " " " "

The second group of teaching and learning activities in terms of frequency of encounter and made up of demonstration, discussion and projects, had apparently been experienced by some 50 - 60% of the survey subjects.

With regard to demonstration as a teaching technique, the frequency of encounter by students of the different courses shows considerable variation which assumes statistical significance when responses of all students attending Day Release courses (O.N.C., H.N.C. and Fellowship course) are compared with those of Sandwich course students (O.N.D. and H.N.D.). It would appear that demonstration is employed to a greater extent in Sandwich courses than in Day Release courses. This is not an unexpected finding in relation to the Fellowship course where students practical experience and expertise is already considerable and where consequently , the demonstration of apparatus, technique or procedure may be felt by lecturers to be less appropriate.

A similar argument may be used to explain the greater frequency of this activity in O.N.D. and H.N.D. courses than in O.N.C. and H.N.C. for although these are very similar with regard to their syllabuses and curriculae , O.N.C. and H.N.C. students, by virtue of their full time employment have more time to acquire practical experience and expertise than do O.N.D. and H.N.D. students.

It may be that lecturers attempt to compensate for this discrepancy by using demonstration activities more extensively when teaching O.N.D. and H.N.D. students.

An alternative explanation for this difference in the frequency of encounter with demonstration procedures may lie in the fact that the size of classes in the O.N.D. and H.N.D. courses tend to be smaller than those of the H.N.C. and O.N.C. courses and that the lecturers may therefore find demonstration activities more practicable in the former than in the latter.

The distribution by course of the 116 (54%) students who reported experience of discussion as a teaching and learning activity, can be seen from Fig.7.8. to be particularly significant in respect of the Fellowship course where all the students appear to have encountered it.
This activity seems to have been employed substantially, though to a lesser extent, in all other courses with a significant variation in its occurrence, which does not appear to be directly related to either level of course (Ordinary or Higher) or to mode of attendance (Day Release or Sandwich).

Experience of practical projects, reported by 104 (49%) students, also shown in Fig.7.8. appears to be more prevalent in the higher level courses, particularly in the Fellowship course where 86% of students attending that course stated that they had encountered this sort of work. These findings are predictable in view of the formal place which projects occupy in the curricula of H.N.C. and H.N.D. courses. It is known that at the time of survey, very few students of the Fellowship course were undertaking this sort of work and it is probable that the high percentage of positive responses obtained from these students was due to their referring to experience gained in courses which they had attended previously.
In view of the fact that practical projects do not constitute a formal part of the curriculum for O.N.C. or O.N.D., the 11 (20%) and 5 (17%) of students respectively of these courses were quite possibly referring to practical laboratory exercises which some lecturers choose to pursue in the form of on-going projects.

The third group of teaching and learning activities - visits to specialised laboratories, lectures by visiting specialists and seminar work - appear to have been encountered by a substantially smaller proportion of the survey population (31 - 36%), than the two previous groups of activities.

For a variety of reasons this is not surprising. Specialised laboratories which are suitable and available for class visits must naturally be limited in number and the feasibility of visits may be further affected by the size of classes. Fig.7.8. shows that such visits are most prevalent in the Fellowship course where 32 (73%) of students reported participation in them.

Among the remaining courses, the frequency of this form of teaching was in every case less than 50% and for the O.N.C. course was as little as 8%. It would appear that visits to specialised laboratories are used to only a limited extent in all courses except the Fellowship course where, owing to the level of knowledge and experience required, this type of activity assumes considerable importance and receives notable attention.

Availability is less likely to be a limiting factor in the use of visiting specialist lecturers. It is more probable that the presence in the college of specialised full-time teaching staff, coupled with the limitations in funds available for the payment of visiting lecturers, are the major determinants of the frequency of this particular teaching activity. Given these constraints, it is to be expected that the college would give priority, in respect of visiting specialist lecturers, to those courses where the most advanced and up-to-date specialised teaching is necessary. This is confirmed by the findings shown in Fig.7.8. which indicate that 98% of the students in the Fellowship course had encountered this teaching activity, while in all other courses the frequency of experience of visiting specialist lectures is nowhere greater than 24%.

The last and most infrequently encountered teaching and learning activity - seminar work - shows a frequency of encounter very similar to that found for visiting specialist lecturers in that most students in the Fellowship course report encountering it, while far fewer students of all other courses had apparently experienced it. The reasons for this distribution are probably that in the first place, seminar work is seen by lecturers as appropriate to the relatively small student groups found in the Fellowship course but much less so to the lower level courses which are less fragmented into small groups of students; secondly, teaching staff are likely to feel that seminar work is more appropriate to the objectives of the Fellowship course which emphasise the importance of development of students ability to evaluate, discriminate and form soundly based opinion, than to the lower level courses in which knowledge and understanding tend to be seen as the primary objectives.

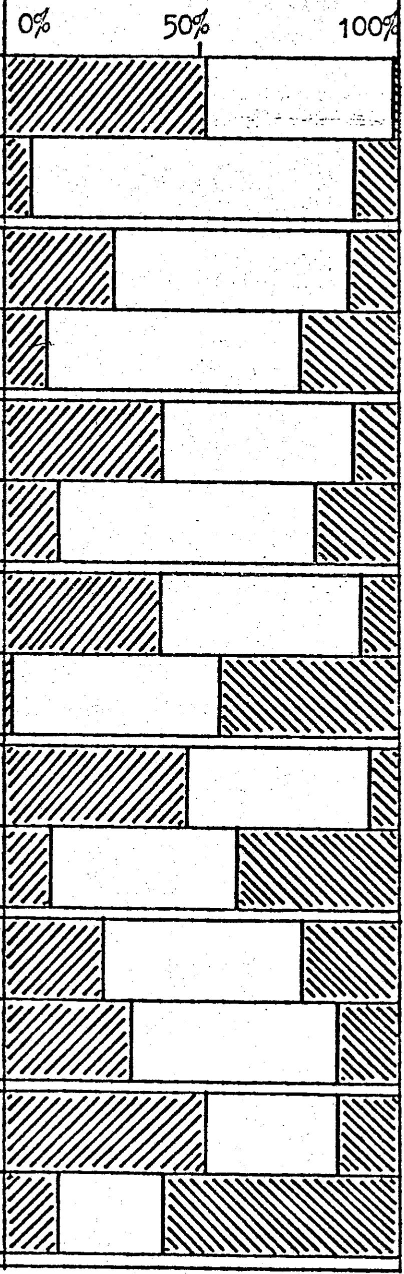
Fig.7.9. shows the extent to which each of the listed teaching and learning activities were considered by the students to be helpful to their studies and also shows their opinion of the time allocated to each activity.

Comments on the frequency of response to each category have already been made in discussion of the findings presented in Fig.7.8. and it is reassuring to find that in relation to the probable validity of the responses concerning helpfulness and time allocation to the various activities, the numbers of subjects responding to the part of the question concerning helpfulness, closely correlates with the numbers responding to that part concerned with time allocation. This does suggest that the survey subjects gave positive responses only in respect of those teaching and learning activities of which they had actual experience.

Fig.7.9.

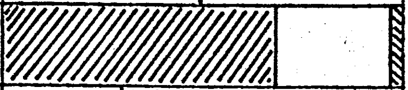
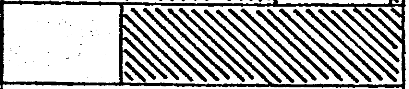
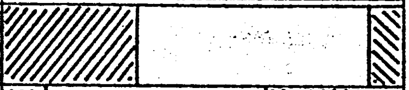
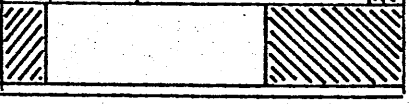
Extent to which the specified Teaching and Learning Activity were considered by the students as Helpful to their studies and their opinions of the Time Allocated to each of the specified activities.

Teaching or Learning Activity		Frequency			
		n	%A	%B	%C
Lectures	Helpful	212	51	48	1
	Time Alloc.	197	7	81	12
Homework	Helpful	200	27	60	13
	Time Alloc.	190	11	64	25
Prac. Exerc.	Helpful	185	40	48	12
	Time Alloc.	176	13	66	21
Demonstr.	Helpful	127	39	51	10
	Time Alloc.	122	2	52	46
Discuss.	Helpful	116	46	47	7
	Time Alloc.	111	11	48	41
Prac. Projects	Helpful	104	24	52	24
	Time Alloc.	98	32	53	15
Visits to labs.	Helpful	77	51	34	15
	Time Alloc.	78	13	27	60



(Continued on page 217)

Fig.7.9.(continued from page 216)

Teaching or Learning Activity		Frequency				
		n	%A	%B	%C	0% 50% 100%
Visiting Lects.	Helpful	71	69	28	3	
	Time Alloc.	69	0	28	72	
Seminars	Helpful	66	33	58	9	
	Time Alloc.	66	11	54	35	

		Helpfulness	Time Allocation
%A = ▨	= % response under:	Very Helpful.	Too Much Time.
%B = □	= % " "	Fairly Helpful.	Time About Right.
%C = ▧	= % " "	Not Helpful.	Not Enough Time.

While it may be reasonable to postulate an 'ideal response' pattern for this question where 100% of the subjects give a 'Very Helpful' response in respect of helpfulness of the activity, and where 100% of the subjects give an 'About Right' response in respect of time allocated to the activity,selecting a point at which deviations from such an ideal response become statistically significant would be of questionable validity for two reasons: in the first place the limitation in the response scale to three points provides a rather limited statistical base for the calculation of meaningful distribution characteristics; secondly, the scaling is based on subjective evaluations which cannot be assumed to be quantitative and could only be verified by testing.

Some comment on these responses in essentially qualitative terms does however seem to be justified, particularly if the findings concerned with helpfulness and time allocation for each activity are viewed together.

In their ratings of lectures, virtually all the subjects found them to be helpful and the great majority considered the time allocation to lectures to be about right.

Homework and practical exercises were seen by the majority to be helpful although fewer thought these activities to be very helpful. While the majority of subjects felt the time allocation to be about right, notably more believed the time allocation to these to be insufficient rather than excessive.

Responses to this question concerning projects indicated that an appreciable number of the subjects considered this type of activity to be unhelpful, and rather more believed too much time was devoted to projects.

For the remaining activities, demonstration, seminars, discussion, visits to specialised laboratories and specialist visiting lecturers, all appeared to be found helpful by the large majority of those with experience of them, with visits to specialised laboratories and specialist visiting lecturers especially so.

The time allocation to these activities was considered to be inadequate in every case by a substantial proportion of the students with visits to specialised laboratories and specialist visiting lecturers receiving this rating by a majority.

Fig.7.10. shows the distribution of student opinion on the importance and adequacy of provision of a variety of curricular features of supportive science and specialist applied subject studies respectively.

The data has been presented in numerical form (%) in a single table, at the expense of illustration by histogram, in order to facilitate recognition of notable features common to responses relating to both study areas. These are outlined in heavy print.

Certain general trends are apparent in the findings.

The distribution of student opinion of the importance of the listed curricular features in the specialist applied subjects is invariably skewed to the left, suggesting that all the features listed are believed to be of considerable importance to these studies.

Similar, but significantly less pronounced skewing is apparent in the student opinion of most of the curricular features as they apply to supportive science studies.

It may well be that this overall difference in importance rating reflects their opinion of the relative importance of these two subject areas as well as being a comment on the respective curricular features.

Fig.7.10.

Distribution of student opinion of the Importance and of the Adequacy of Provision of a variety of Curricular Features of supportive science studies and of specialist subject studies.

Curricular Feature	Supportive Science								Specialised Subject							
	n	%A	%B	%C	n	%D	%E	%F	n	%A	%B	%C	n	%D	%E	%F
Up-to-date Information	206	53	39	8	197	13	72	15	191	93	6	1	188	21	54	25
Breadth of Information	199	33	57	10	194	11	71	18	186	74	26	0	184	24	61	15
Depth of Information	199	19	55	26	194	10	73	17	183	72	27	1	184	22	58	19
Visual Illustration	197	30	51	19	194	6	50	44	183	53	46	6	183	18	58	24
Relating topic to work	198	54	35	11	194	5	38	57	183	83	15	2	180	27	56	17
Duration of lectures	197	30	54	16	191	13	72	15	183	57	41	2	178	18	60	22
Time for Questions	191	38	53	9	187	10	59	31	180	61	37	2	175	30	58	12
Duration of Practicals	184	30	50	20	177	12	65	23	167	54	40	6	163	23	61	16
Choice of Practicals	178	42	34	24	173	10	55	35	164	57	37	6	160	24	57	19
Supervision of Practical	184	47	43	10	179	19	58	23	169	53	42	5	163	28	58	14

(Continued on page 221)

Fig.7.10. (continued from page 220)

Curricular Feature	Supportive Science								Specialised Subject							
	n	%A	%B	%C	n	%D	%E	%F	n	%A	%B	%C	n	%D	%E	%F
Constructive Criticism	187	57	36	7	182	12	47	41	175	73	26	1	172	24	53	23
Homework	191	24	48	28	180	9	60	31	180	39	47	14	177	18	62	20
Practical Projects	159	21	40	39	143	15	48	37	152	38	50	12	146	23	45	32
Overall Response	-	37	46	17	-	11	59	30	-	63	33	4	-	23	57	20

%A = percentage of respondents who thought feature Very Important

%B = " " " " " " Fairly Important

%C = " " " " " " Not Important

%D = " " " " " provision Very Satisf.

%E = " " " " " " Fairly Satisfact.

%F = " " " " " " Not Satisfactory.

Opinion on the quality of provision of the various features in relation to the specialised subjects show a near-normal distribution while that relating to supportive science is significantly different, tending to skew to the right - that is in the direction of provision being considered unsatisfactory. Attributing this difference to variation in the student opinion of the relative importance of the two subject areas is probably invalid in this context, as their opinions of the provision of curricular features are probably based on their experience of teaching methods, facilities and arrangements rather than on subjective prejudices.

Responses relating to certain specific curricular features also merits some attention.

Three features - Up-to-Date Quality of Information Provided, Relating of Study Topic to Work, and Constructive Criticism of Coursework - received particularly high importance ratings with respect to both main subject areas and two other features - Breadth of Information Provided and Depth of Information Provided - have a notably high importance rating in the Specialised subject area only.

While opinion on the quality of provision of these features is in most instances unremarkable, that referring to Relating of Topics to Work in the supportive science area is very heavily skewed to the right, indicating a predominant belief that provision is quite substantially unsatisfactory.

It is perhaps predictable that technicians performing the highly specialised and sophisticated techniques common in current medical laboratory practice should feel that features of vocational courses most closely related to these activities are of greatest importance. It is reassuring to see that in most instances, student opinion of the provision of such features shows a high level of satisfaction.

Relating of Topics to Work is exceptional to this group of curricular features in respect of the level of satisfaction shown towards its provision in the supportive sciences area. Concern in this area has been noted previously in this chapter and may suggest that students are inclined to fully appreciate only those studies which are directly and obviously relevent to their work and tend to reject topics which are of a more fundamental and supportive nature.

Three features which received a rather atypical response in this question concerning the supportive sciences area are Depth of the Information Provided, Setting of Homework and Practical Projects. All three were felt to be unimportant by more than 25% of the survey subjects and in the case of the last two features, more than 30% found them to be unsatisfactory.

Provision for the Practical Projects in the specialised subject area was also found to be unsatisfactory by 32% of the subjects. The response pattern concerning the importance of these three features and also the provision of Regular Homework may be further comment which has its roots in the immediately discernable relevence of Supportive Sciences.

The dissatisfaction over the provisions for Practical Projects in both areas of study might be explained as criticism of the facilities with which these activities are pursued.

The open question inviting students to comment on teaching and learning activities brought responses from 187 (88%) of the survey population.

Many of the points made echoed comments prompted by the previous open question discussed in this chapter. They also tend to confirm some of the conclusions drawn from responses to structured questions concerning Course Content and Curriculum.

A small number of respondents simply expressed their satisfaction with the Teaching and Learning Activities which they met but the majority of respondents criticised - mostly in a reasonable and constructive manner - the content of courses and the teaching methods employed.

The relevance of some study areas was questioned by more than 25% of the respondents who argued variously that " too much time is devoted to irrelevant subjects", that "more time should be devoted to specialised option studies", that "the basic sciences should be more closely related to option subjects" and that "there should be more job-related practical work". Several students contended that "Liberal Studies should have less time" and that "it should be voluntary". One student took an extreme stance and predicted that "the college would please our employers and their students a lot by basing courses entirely on the specialist option subjects".

Several students complained that the multiplicity of lecturers they met caused them some difficulty and one suggested solution to this was that "one lecturer should teach all the work in M.L.S. to avoid the present disjointed arrangement".

Among the considerable number of comments on teaching methods, some were contradictory, probably because they were based on experiences with different lecturers. Thus, although a number of students felt that "some teaching methods are excellent", rather more thought that "explanation and detail was inadequate". A few found "lectures too formal" while one or two others advocated "longer and deeper lectures".

One of the most predominant arguments occurring in the responses to this question was condemnation of note-taking and advocacy of much greater recourse to hand-out notes and the use of visual aids. One student illustrated his predicament by pointing out that "lecturers say - take down the important and relevent points - what are these?, we hav'nt done the course before". Another student suggested that "more use could be made of printed hand-outs to avoid the time-wasting process of writing notes and copying from the blackboard. If basic notes could be printed in a hand-out, more work could be covered in a shorter time and perhaps in greater depth." A more structured use of this sort of device was proposed by another respondent who wished to see " hand-outs issued instead of notes, with the lecture period taken up in discussion of the previous week's hand-out. This would give more time to recognise problems and discuss them in full."

The fact that one respondent commented that "visual aids could be better but I like the hand-out notes when they are provided", at least indicates that these teaching aids are employed by some lecturers.

Adequate time for discussion was another matter which concerned many students, some of whom felt that "not enough time was devoted to discussing difficulties and problems which arise during lectures". However, from another comment that "discussion in the option subject is the best feature of the course - very interesting, stimulating and useful",it appears that this is yet another variable feature of the courses.

A number of students suggested that more tests and homework were desirable and would inject more discipline into their studies. Thus one commented that "lack of discipline leading sometimes to a carefree attitude on my part, together with a lack of homework, results in no interest or revision outside college" while another felt that "more work should be set, marked and criticised by lecturers to give the student some idea of his progress".

The participation of visiting lecturers was advocated by a large number of respondents, some of whom thought that "they would be of particular value in specialist option subjects".

It was suggested by a few that "laboratory equipment is rather poor" and "equipment is unsatisfactory for practical exercises although most lecturers are keen".

One student commented humbly that "I do not believe that I have the knowledge to decide what I should be taught"!

Section 4. College Facilities.

All facilities at the college are available equally to all students irrespective of the course which they are following or their mode of attendance. It may be assumed that all students have some experience upon which to base an opinion of the most important facilities, although differences in course curricula may influence the extent of that experience in respect of academic facilities, and their mode of attendance may result in varying experience of ancillary facilities. Every student will have used lecture accomodation extensively. The very large majority will also have spent much time undertaking practical work in college laboratories, the only exceptions being those students pursuing the Fellowship course who entered directly by possession of a science degree.

All students might be expected to have made some use of college library facilities to an extent probably depending upon their academic diligence, the degree of encouragement in this direction received from lecturers, and the amount of opportunity which they have to do so. This last factor may be determined to some extent by the attendance mode of the course which they are following, Sandwich Course students having notably more private study time at college than Day Release students.

Students automatically become members of the Students Union on enrolment to any course but their participation in its activities and use of/its facilities will vary according to personal inclination and again will probably be affected by the free time they have when they are at college - determined largely by their mode of attendance.

Student opinion of the various facilities are likely to be influenced by a number of identifiable factors. Their views on the adequacy of lecture and laboratory accomodation and laboratory facilities and equipment may be swayed by the size of their classes. A lecture room or laboratory which comfortably accomodates a small class is certain to be found less pleasant to work in by a large class; laboratory facilities and equipment which are adequate for small student groups may be a cause of dissatisfaction among larger groups..

The type of course which students pursue - Day Release or Sandwich - may be a determinant of their opinion of college facilities as a consequence of their different levels of experience. Sandwich Course students, having entered the course directly from school, will probably use the accomodation and laboratory facilities and equipment which they used there as a basis for judging that of the college. For most of them college facilities are likely to seem more extensive and elaborate.

Day Release students on the other hand, will have had experience of facilities within hospital laboratories and these will almost certainly be more sophisticated in terms of laboratory facilities and equipment and may be more adequate in terms of accomodation than are those of the college.

In a similar way, student opinion of library and Student Union facilities may be affected by the type of course which they are following as they are again likely to use their experience of such facilities in either school or hospital as their yardstick.

Comment on the adequacy of some of the listed facilities, most notably laboratory accomodation, facilities and equipment, may also be affected by the level of the course to which the students are committed. The needs of those following the O.N.C. or O.N.D. courses will in these respects be more modest than those following the more advanced courses - H.N.C. and H.N.D..

The factors most likely to be significant explanatory variables in

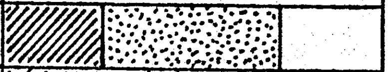
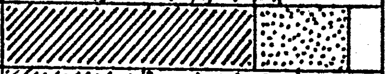
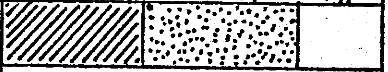
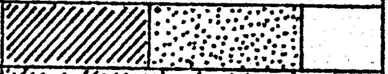
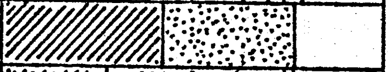
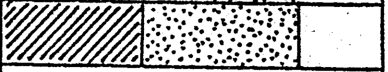
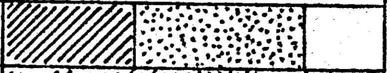
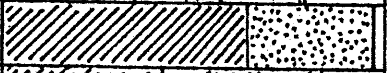
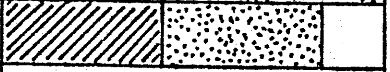
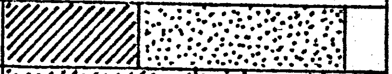
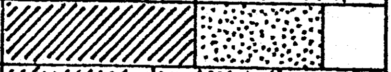
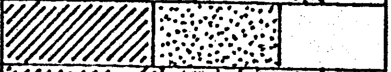
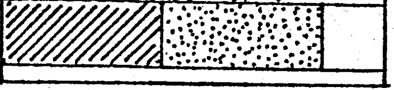
evaluating student opinion of college facilities would therefore seem to be class size, mode of attendance and level of course.
It is however unfortunate that in the population surveyed there is a degree of correlation in class size and mode of attendance - Day Release courses having a class size of 20 - 33 students and Sandwich courses having a class size of 8 - 18 students - which makes any statistical significance in the response distribution with these two variables difficult to attribute reliably to one or the other.
Responses are therefore analysed against mode of attendance and level of course only and the possible significance of class size is taken into account when comment is made on the significance of findings associated with these two variables.

<u>Fig.7.11. and Fig.7.12</u>. show the distribution of student opinion of the adequacy of specified college facilities by mode of attendance and by level level of the course which students were following.
165 (78%) of the respondents rated Lecture Accomodation as 'Good' or 'Fair', 175 (84%) judged Laboratory Accomodation similarly, and 147 (71%) thought the same of Laboratory Facilities and Equipment.
Library Facilities were considered 'Good' or 'Fair' by 179 (86%) of the respondents while Student Union Facilities were seen to be 'Good' or 'Fair' by 86 (44%) of those who recorded an opinion on that facility.
It appears that a large majority of the survey subject - approaching or in excess of 75% - found the first four of the five specified facilities at least 'Fair'. A notably lower proportion of the subjects (44%) held similar views of the Student Union Facility.

Student opinion of the first three facilities - Lecture Accomodation, Laboratory Accomodation and Laboratory Facilities and Equipment - when analysed against mode of attendance and course level, exhibited

Fig.7.11.

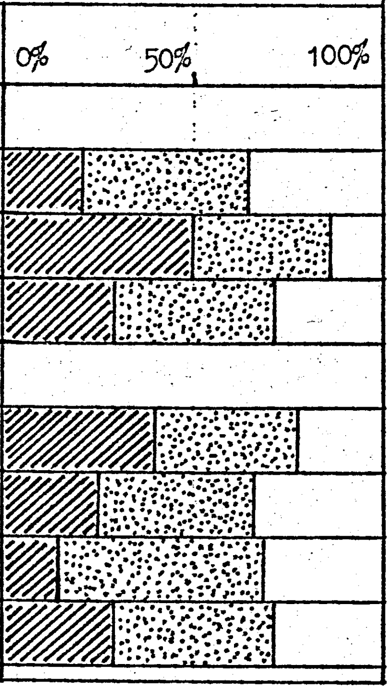
Distribution of Student Opinion of Lecture and Laboratory Accomodation and Laboratory Facilities and Equipment by Mode of Attendance and Level of Course.

Facility versus Mode and Level		Frequency				
		n	%A	%B	%C	0% 50% 100%
Lecture Accom.	Mode					
	Day Release	154	26	47	27	
	Sandwich	58	67	24	9	
	Total	212	37	41	22	
	Level					
	O.N.C./D.	82	38	41	21	
	H.N.C./D.	86	42	35	23	
	S.F.I.M.L.S.	44	27	50	23	
	Total	212	37	41	22	
Lab. Accom.	Mode					
	Day Release	151	34	45	21	
	Sandwich	58	64	33	3	
	Total	209	42	42	16	
	Level					
	O.N.C./D.	82	35	54	11	
	H.N.C./D.	86	50	34	16	
	S.F.I.M.L.S.	41	39	34	27	
	Total	209	42	42	16	

(Continued on page 231)

Fig.7.11.(continued from page 230)

Facility versus Course Mode and Level		Frequency			
		n	%A	%B	%C
Laboratory Facilities and Equipment	**Mode**				
	Day Release	150	21	43	36
	Sandwich	58	50	36	14
	Total	208	29	42	29
	Level				
	O.N.C./D.	82	40	37	23
	H.N.C./D.	86	25	41	34
	S.F.I.M.L.S.	40	15	53	32
	Total	208	29	42	29



%A = ▨ = Percentage of respondents considering facility **Good**

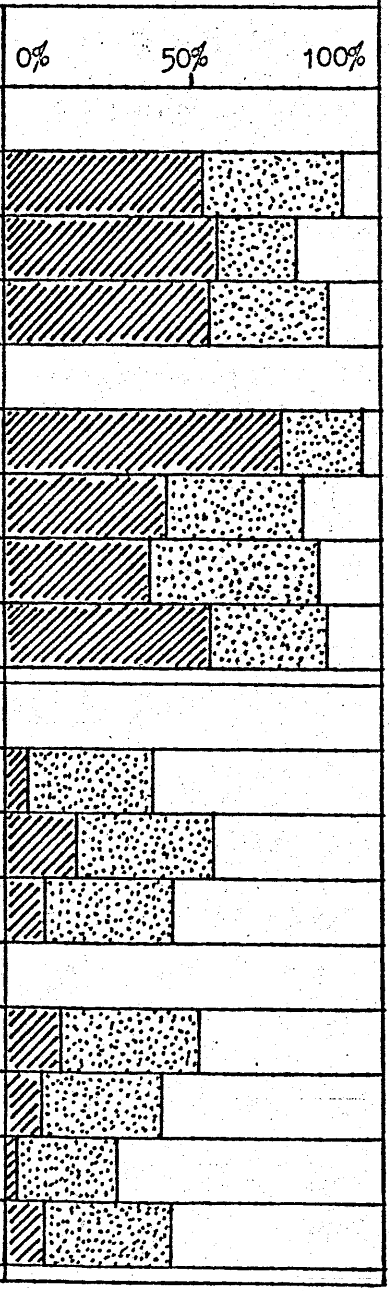
%A = ▒ = " " " " " **Fair**

%C = ☐ = " " " " " **Poor**

Fig.7.12.

Distribution of Student Opinion of Library Facilities and of Student Union Facilities by Mode of Attendance and by Level of Course.

Facility versus Mode and Level		Frequency				
		n	%A	%B	%C	0% 50% 100%
Library	Mode					
	Day Release	149	53	37	10	
	Sandwich	58	57	21	22	
	Total	207	54	32	14	
	Level					
	O.N.C./D.	82	73	22	5	
	H.N.C./D.	83	43	36	21	
	S.F.I.M.L.S.	42	38	45	17	
	Total	207	54	32	14	
Student Union	Mode					
	Day Release	139	7	32	61	
	Sandwich	58	19	36	45	
	Total	197	11	33	56	
	Level					
	O.N.C./D.	79	15	37	48	
	H.N.C./D.	78	10	32	58	
	S.F.I.M.L.S.	40	3	28	70	
	Total	197	11	33	56	



%A = ▨ = percentage of respondents considering facility Good

%B = ▒ = " " " " " Fair

%C = ☐ = " " " " " Poor

a consistent and significant pattern. All three were considered to be satisfactory by a significantly higher proportion of Sandwich Course students than of Day Release students. There is however, no significant difference in the distribution of student opinion on these facilities according to the respective levels of study.

Findings relating to Library Facilities show a different response pattern in that there is a significant difference in the extent of satisfaction with this facility when responses are viewed against attendance mode and against course level. A smaller proportion of Sandwich Course students than Day Release students appear to be satisfied with Library Facilities and the extent of student satisfaction does also appear to decrease significantly and progressively as courses become more advanced.

Student opinion of Student Union Facilities, which has been seen to indicate a relatively low overall level of satisfaction, is again significantly different when responses are set against mode of attendance, Day Release students appearing to be even more dissatisfied with these facilities than are Sandwich Course students. There is no significant correlation between the extent of student satisfaction (or dissatisfaction) with Student Union Facilities and the levels of their courses.

Student Comment on College Facilities.

Responses to the open question inviting student comment on the facilities provided at college contributed to a much clearer understanding of the response patterns obtained from the previous closed questions on these matters.

137 (64%) of the survey subjects made comment on college facilities, a minority of these in general terms and the remainder in specific terms relating to one or more of the listed facilities.

Of the 23 (11%) students whose comments were of a general nature, 16 (70%) considered college facilities to be "fair" or "very good" while 5 (21%) felt they were "inadequate".

One student thought that "Classes were too large": another found " the absence of lifts in college buildings a serious inconvenience".

(i).Lecture Accomodation

Responses contained 37 (27%) references to lecture accomodation and all were of a disapproving nature. The most common complaint was that "lecture rooms are uncomfortable", the most frequent reason given for this being that "desk tops provide too small a writing area". Other respondents found that "Lecture rooms are very cold in the winter" and some found the "seating most uncomfortable". The other notable feature which emerged in the comment on lecture accomodation is that many lectures, some of two or three hours duration, appear to be given in laboratories because of an apparent insufficiency of lecture rooms. A few students took exception to "classrooms being double-booked" and to the "confusion caused by sudden room changes, particularly in the early weeks of the course".

(ii).Laboratory Accomodation.

Apart from the objections already referred to concerning the apparent discomfort experienced when laboratories were used for lecture purposes, only 10 (7%) of the respondents commented on laboratory accomodation. Three felt this to be "good" while the remainder complained of "overcrowding" or of discomfort which appeared to be due to the laboratories being used for lecture purposes.

(iii). Laboratory Facilities and Equipment.

32 (15%) of the survey subjects made criticism of these facilities and these were equally divided between the view that they were insufficient and that they were often obsolete. One student, observing that "a lot of equipment and techniques seem out of date and second-hand, donated by laboratories where it had been replaced by modern apparatus", attributed this to "lack of funds".
Another student complained that "basic equipment was sometimes lacking".

(iv). Library Facilities.

The 18 (8%) of the students who commented on college library facilities were mainly concerned about "insufficient books on the specialised subjects" and about "inadequate copies of books that are in great demand". It was also alleged that "books are often out of date".
One student remarked on the "good environment for study" which the library provided but another pointed out that "Day Release students have little free time which can be spent in the library".

(v). Student Union Facilities.

Comment on Student Union facilities were more consistently and severely disparaging than those on any other facility.
Concern among the 17 (12%) respondents on this subject was almost equally divided between the canteen facilities which were said to be "disgusting" and where the food was apparently "very poor and too expensive", and the "almost total lack of any leisure activities" and the "non-existent facilities for recreation". On this last issue, two female students deplored the "absence of any relaxation facilities set aside for women students.

Chapter Eight

Laboratory Training

Introduction

Having examined, in the previous chapter, student opinion of various aspects of the academic training which they recieve in vocational courses pursued at college, the present chapter turns to the hospital laboratory situation to study some of the features of in-service training of medical laboratory technicians as seen and experienced by the survey subjects.

The chapter is seen to have two functions: one of attempting to describe something of the students views of the provision and the arrangement of in-service training, and one of exploring the relationship between some of these and other situational factors.

The first section is concerned with the amount of training which students receive in their place of work and the regularity with which it is provided.

Section Two attempts to identify the staff who provide the training, determine the extent of their contribution and assess the extent to which they relate the training they provide with the students studies at college.

Section Three explores the principal features of the training which students received and describes the facilities which they stated were employed for this purpose.

Section Four attempts to establish what the students considered to be the primary motives for providing in-service training and also investigates their evaluation of whatever training they receive.

As in previous chapters, the general approach within each section has been to describe the incidence or distribution of student response and then to examine the ways in which and the extent to which it appears to be related to certain variables.

Section 1. The Amount and Regularity of Training.

The literature concerned with in-service training of medical laboratory technicians provides little definitive information on how much time should be, or is in practice devoted to this activity. This section is therefore primarily devoted to simply describing the amount and the regularity of the in-service training recieved by the survey subjects and examining it in the light of certain variables.

Fig.8.1. shows the distribution of the time in an average week which is specifically set aside for student training, against the college course and the mode of attendance which the students were following.

In overall terms it is apparent that for slightly over half of the respondents (51%), in an average week, no time was set aside for training in the work situation. For the remainder of the subjects it seems that almost equal numbers experienced less than one hour (16%), between one and three hours (18%) and more than three hours (15%) training in an average week.

There is no significant variation in the responses which relates to the level of courses but the findings do show significant differences in the responses according to mode of college attendance.

Thus Fig.8.1. shows that while almost two thirds (65%) of the students attending Day Release courses reported having no time specifically set aside for training each week, only 14% of the Sandwich Course students gave a similar response.

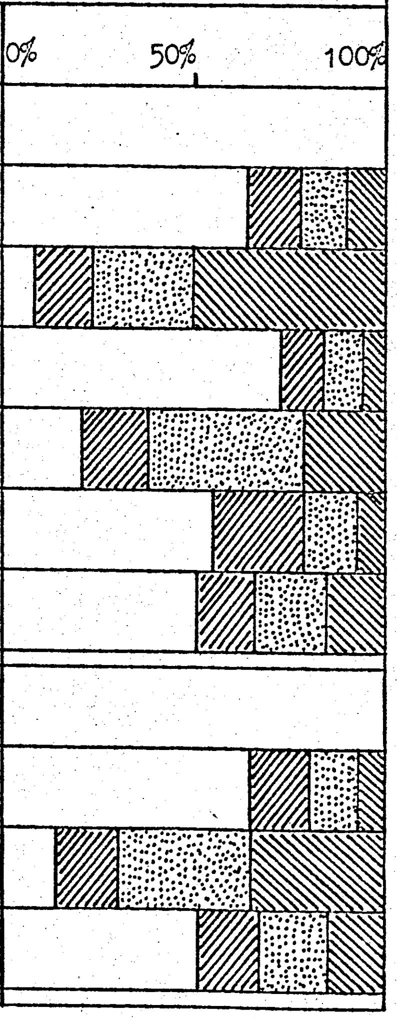
At the same time, 35% of the Sandwich Course students reported receiving more than three hours training per week, while only 7% of the Day Release students reported receiving this amount of training.

These findings suggest that significantly more attention is given to the training of students pursuing Sandwich courses than to those who

Fig.8.1.

Distribution of Student Responses concerning the Time in an average week specifically Set Aside for Student Training against the College Course and the Mode of Attendance they were following.

College Course and Mode of Attendance	Frequency				
	n	%A	%B	%C	%D
College Course					
O.N.C.	49	64	14	12	10
O.N.D.	26	8	15	27	50
H.N.C.	56	73	11	11	5
H.N.D.	29	21	17	41	21
S.F.I.M.L.S.	42	55	24	14	7
Total- All Resp.	202	51	16	18	15
Mode of Attendance					
Day Release	147	65	16	12	7
Sandwich	55	14	16	35	35
Total- All Resp.	202	51	16	18	15



%A = □ = % respondents reporting No Time set aside for training

%B = ▨ = " " " Less than One Hour " " "

%C = ░ = " " " From One to Three Hours " "

%D = ▧ = " " " More than Three Hours " " were attending Day Release courses.

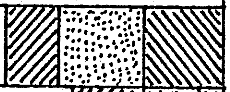
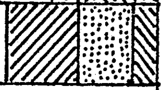
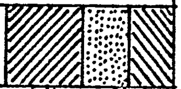
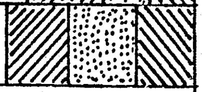
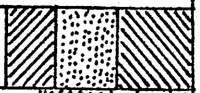
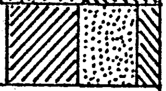
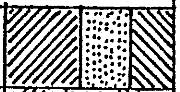
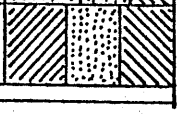
It might be argued that the inclusion in the Day Release group of the students who were attending the Fellowship course, who are already statutorily qualified and thus might perhaps understandably receive less formalised training, places the validity of such a conclusion in question. The difference in the distribution of the responses of Day Release and Sandwich students does however remain significant when the responses of the Fellowship students are omitted from the comparison. The upper table in Fig.8.1. shows that in other Day Release courses - O.N.C. and H.N.C. - responses are equally or even more different to the responses of Sandwich Course students than are those of the Fellowship students. This would therefore appear to confirm the proposition that more attention is given to the training of Sandwich Course students than to the training of those attending Day Release courses.

Fig.8.2. shows the distribution of student responses concerning the time in an average week specifically set aside for student training, against the types of institution employing or providing training placements for them.

The upper table presents the distribution which is derived from the responses of all the respondents and there is a significant variation which relates to type of institution. It would appear that the laboratories within the Teaching Hospital Group tend to set aside in an average week more time for student training than do the laboratories in the other types of institution listed. There is no significant difference in the amount of training reported by students of 'Other' institutions when compared with those of the District General Hospital laboratories. The student sample representing the Regional Blood Transfusion Centre was too small for any valid conclusions to be drawn from their responses to this question.

Fig.8.2.

Distribution of Student Responses concerning the Time in an average week specifically Set Aside for Student Training against the Types of Institution employing or providing training placements for the students.

Type of Institution	Frequency					
	n	%A	%B	%C	%D	0% 50% 100%
All Students						
Teaching Hosp. Group	112	43	14	22	21	
District Gen. Hosp.	62	61	18	15	6	
Blood Transf. Centre	3	100	0	0	0	
'Other' Instit.	25	56	20	12	12	
Total - All Resp.	202	51	16	18	15	
All Students Except H.N.D.						
Teaching Hosp. Group	83	51	13	16	20	
District Gen. Hosp.	62	61	18	15	6	
Blood Trans. Centre	3	100	0	0	0	
'Other' Instit.	25	56	20	12	12	
Total - Less H.N.D.	173	56	16	14	14	

%A = □ = % respondents reporting No Time set aside for training

%B = ▨ = % 2 " Less than One Hour " " "

%C = ░ = % " " From One to Three Hours " "

%D = ▧ = % " " More than Three Hours " "

Taking into account the significant difference in the time set aside for training for Sandwich Course students compared with that for Day Release students, as shown in Fig.8.1., it was thought appropriate to investigate whether that difference had any bearing on the findings relating to types of institution.

It is known that the training of O.N.D. students is undertaken by most of the institutions listed and for this reason the responses of these students concerning the time set aside for training would be unlikely to be responsible for significant variation in the findings for the various institutions.

H.N.D. students on the other hand, are trained exclusively at the University Hospital of Wales which is the major employer of medical laboratory technicians within the Teaching Hospital Group, and their responses might well have affected such findings.

The lower table in Fig.8.2. shows this to be the case. When the responses of H.N.D. students are excluded, the difference in the amount of time set aside by the various institutions for training ceases to be significant.

Further exploration of this area of enquiry was attempted by comparison of the response pattern of students trained at the University Hospital of Wales with those of students trained in other laboratories within the Teaching Hospital Group, with and also without the inclusion of H.N.D. students in the population of the University of Wales. No significant differences were demonstrable in either of these comparisons.

A possible explanation, compatible with these collective findings concerning the time set aside for student training in the various institutions might be that a greater amount of training received by H.N.D. students, than by other students in the Teaching Hospital Group although not significant in itself, contributes to a significant difference when the amount of training received by all students of the Teaching Hospital Group is compared with that received by students of the District General Hospitals and by those employed in 'Other' institutions.

It is notable that there is no significant difference in the amount of training received by students employed in the District General Hospitals and those of the 'Other' institutions.

The sample number of students trained in the Regional Blood Transfusion Laboratory was too low to permit any reliable conclusions to be drawn from their responses.

Fig.8.3. shows the distribution of student responses concerning the regularity of the training provided for them against the college course and the mode of attendance they were following.

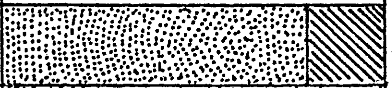
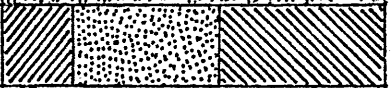
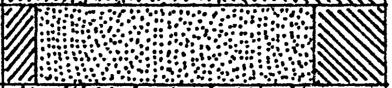
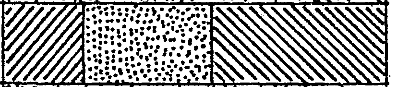
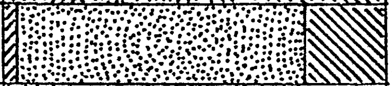
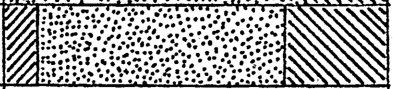
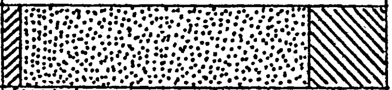
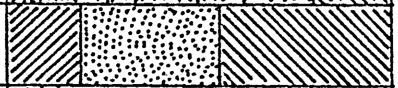
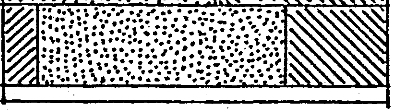
Of the 191 (90%) of the survey subjects who indicated the manner by which they were trained, 16 (8%) stated that their training was arranged and carried out on a regular basis. For the majority (124 or 65%), training appears to have been provided in a spontaneous and irregular manner and the remaining 51 students (27%) indicated that they received a mixture of arranged and regular, and spontaneous and irregular training.

These findings suggest that the in-service training of the survey population is predominantly spontaneous and irregular and this observation is further supported by an interpretation of these findings which shows that 92% of the respondents received some spontaneous and irregular training while only 35% of them received any training in an arranged and regular manner.

From the upper table in Fig.8.3. it can be seen that there is no significant difference in the mode of training received which related to the level of courses - either Day Release or Sandwich.

Fig.8.3.

Distribution of Student Responses concerning the Regularity of the Training provided for them against the College Course and the Mode of Attendance they were following.

College Course and Mode of Attendance	Frequency				
	n	%A	%B	%C	0% 50% 100%
College Course					
O.N.C.	51	0	80	20	
O.N.D.	28	18	39	43	
H.N.C.	49	8	74	18	
H.N.D.	29	21	34	45	
S.F.I.M.L.S.	34	3	76	21	
Total - All Resp.	191	8	65	27	
Mode of Attendance					
Day Release	134	4	77	19	
Sandwich	57	19	37	44	
Total - All Resp.	191	8	65	27	

%A = ▨ = % respondents reporting Arranged and Regular Training

%B = ░ = % " " Spontaneous and Irregular Training

%C = ▧ = % " " A Mixture of both the above forms

The lower table in Fig.8.3. does however show that Sandwich Course students receive training which is significantly more arranged and regular and significantly less spontaneous and irregular than that received by Day Release students , and taking into account the findings presented in the upper table it would appear that this is so at all levels of study.

Fig.8.4. shows the distribution of student responses concerning the regularity of the training provided for them, against the types of institution employing or providing training placements for them, and also takes into account the influence which responses of H.N.D. students have on these findings.

Fig.8.4. (table i) shows that students employed in the Teaching Hospital Group appear to receive training which is more arranged and regular and less spontaneous and irregular than that received by students employed in the District General Hospitals and this difference is significant. Students of the 'Other' institutions also seem to receive training which, although less arranged and regular than that received by those of the Teaching Hospital Group, is still significantly more so than that received by students of the District General Hospitals. The three students employed in the Regional Blood Transfusion Laboratory appear to receive training on an entirely spontaneous and irregular basis.

Because of the possible influence which the responses of H.N.D. students might have upon these findings, the comparison of responses of students trained in the Teaching Hospital Group with those of students trained in the District General Hospitals is further compared in Fig.8.4.(table ii) after exclusion of the responses of the H.N.D. students. The distribution of responses remained significantly different, indicating that the training of all students employed in

Fig.8.4.

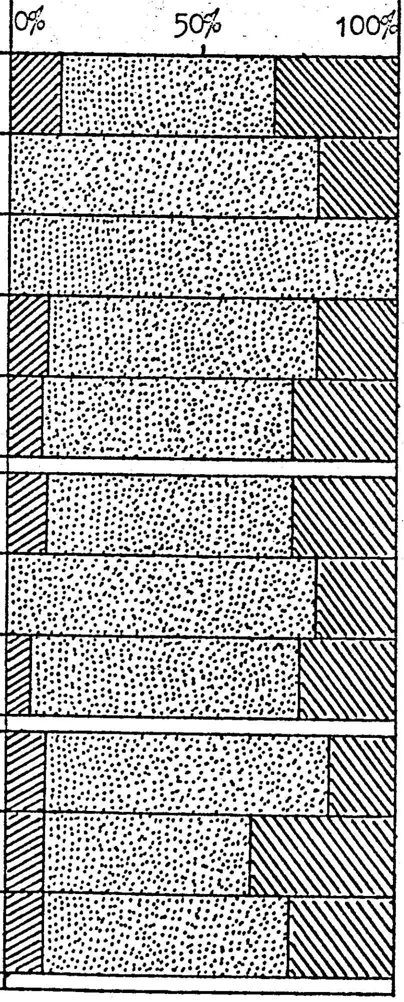
Distribution of Student Responses concerning the Regularity of the Training Provided for them:

(i) against the Types of Institution employing or providing training placement for them,

(ii) for students trained in the Teaching Hospital Group exclusive of H.N.D. students and for those trained in the D.G.H.'s,

(iii) For students trained in the University Hospital of Wales exclusive of H.N.D. students and for those employed in the remainder of the Teaching Hospital Group.

Type of Institution		Frequency			
		n	%A	%B	%C
(i)	Teaching Hosp. Group	109	13	55	32
	District Gen. Hosp.	59	0	80	20
	Blood Trans. Centre	3	0	100	0
	'Other' Institutions	20	10	70	20
	Total - All Resp.	191	8	65	27
(ii)	T.H.G. less H.N.D.	80	10	63	27
	District Gen. Hosp.	59	0	80	20
	Total	139	6	70	24
(iii)	U.H.W. less H.N.D.	40	10	73	17
	T.H.G. less U.H.W.	40	10	53	37
	Total	80	10	63	27



See Fig.8.3. for Key.

the Teaching Hospital Group tends to be more arranged and regular, and less spontaneous and irregular than those of the District General Hospitals.

This conclusion was further tested by a comparison of the responses of students other than H.N.D. students who were employed at the University Hospital of Wales, with those of students in the other laboratories of the Teaching Hospital Group. This comparison is shown in Fig.8.4. (table iii) and shows that setting aside any provision for H.N.D. students, those employed in the laboratories of the University of Wales received significantly less arranged and regular training, and more spontaneous and irregular training than did their collegues in other laboratories of the Teaching Hospital Group.

Section 2. Training Personnel, the Extent and Manner of Instruction and the Relating of Training to College Studies.

An investigation of technician training might rightly be judged to be incomplete without some consideration being given to the question of 'who trains'?. This question certainly seems pertinent to an exploration of medical laboratory technician training, in view of the efforts currently being made to formalise arrangements for their training.

At the time that this survey was made, it is believed that few of the laboratories employing the survey subjects would have fully implemented the recommendations of the D.H.H.S. S.T.M.(74) 29 concerning the provision of laboratory based training and the findings of the first section of this chapter appear to confirm this belief.

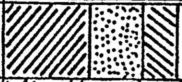
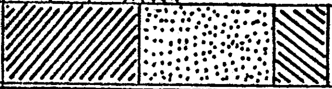
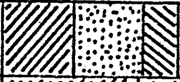
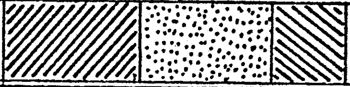
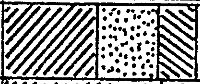
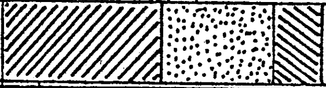
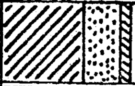
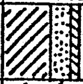
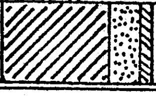
The greater part of whatever training students receive will have been, as has been shown, carried out on a relatively casual basis, determined primarily by the service needs of the laboratory and probably provided mainly by technical staff with immediate responsibilities for various areas of activity within the laboratory. Other laboratory staff, non-medical graduates and also medically qualified personnel are likely to occupy a minor role in technician training, particularly in hospitals outside the Teaching Hospital Group where they would be fewer in number..

It is also probable that the extent to which training is related to college studies will exhibit some relationship to the amount of time which is devoted to this activity.

Fig.8.5. shows the distribution of student responses concerning the extent to which the different categories of laboratory staff

Fig.8.5.

Distribution of Student Responses concerning the Extent of different categories of Laboratory Staff contribution to Arranged and Regular Training and the Spontaneous and Irregular Training of Students.

Staff Category and Mode of Training		Frequency				
		n	%A	%B	%C	0% 50% 100%
Technical Staff i/c Sections	Reg, Tr.	157	22	13	9	
	Irreg.Tr.	188	35	36	14	
Qualified Staff throughout Department	Reg, Tr.	157	18	18	9	
	Irreg.Tr.	188	35	35	19	
Senior Technical Staff	Reg. Tr.	153	24	16	10	
	Irreg.Tr.	183	41	30	12	
Non-Medical Graduate Staff	Reg. Tr.	139	9	5	3	
	Irreg.Tr.	168	21	9	3	
Medically Qualified Staff	Reg. Tr.	147	12	5	2	
	Irreg.Tr.	173	27	8	3	

%A = ▨ = Percentage of respondents receiving A Little training from the staff specified.

%B= ░ = Percentage of respondents receiving A Fair Amount of training from the staff specified.

%C= ▧ = Percentage of respondents receiving A Lot or All of their training from the specified staff.

contribute to the arranged and regular and to the spontaneous and irregular training of student technicians.

Certain features are immediately apparent. It seems clear that the greater part of student training is carried out by the technical staff of the laboratories, the three categories - technical staff in charge of sections, qualified staff throughout the department, and senior technical staff - contributing to virtually the same extent with respect to both arranged and regular training and to spontaneous and irregular training.

The contributions to training made by non-medical graduate and medically qualified staff are also almost identical but are uniformly very much smaller than those of the technical staff categories, providing on average, only 40% of the amount provided by the various technical staff categories.

In the light of the findings presented in Fig.8.3.concerning the mode of technician training, it is not surprising to find that all categories of staff provided far more spontaneous and irregular training than they did arranged and regular training. It is however noteworthy that while all categories of training staff except senior technical staff appear to have provided between 93 and 100% more arranged, regular training than spontaneous and irregular training, senior technical staff seen to have concerned themselves rather more with arranged and regular training to the extent that only 66% more students reported receiving spontaneous, irregular training from them.

Of the students who reported that they received regular and arranged training, 60% apparently received 'a little', 25% received 'a fair amount' and 15% received 'a lot or all' of their training from the specified staff categories.

Of those who received spontaneous and irregular training, 48% stated -

that they received 'a little', 36% recieved a 'a fair amount' and 16% 'a lot or all' from the specified categories of training staff. These proportions for both modes of training were remarkably constant for all the categories of training staff.

It would seem that only a minority of students (15 or 16%) receive 'a lot or all' of their training, regular or irregular, from trainers of one staff category exclusively. A larger minority - 25% in respect of arranged and regular training and 36% in respect of spontaneous and irregular training - appear to receive 'a fair amount' of their training from only one category of trainer.

The largest proportion of respondents - 60% for arranged, regular training and 48% for spontaneous, irregular training - received only 'a little' training from a single category of training staff: their total training was seemingly composed of training received from a number of the listed categories of trainer.

Analysis of student responses to the question concerning the relating of training to students college studies reveal that 33 (16%) of the 202 respondents considered that their training was related 'completely' or 'a good deal' to their college studies while 42 (21%) thought that it was related 'a fair amount'.

The majority of the respondents (107 or 63%) appeared to have found that their training was related 'little' or 'not at all' to their college studies.

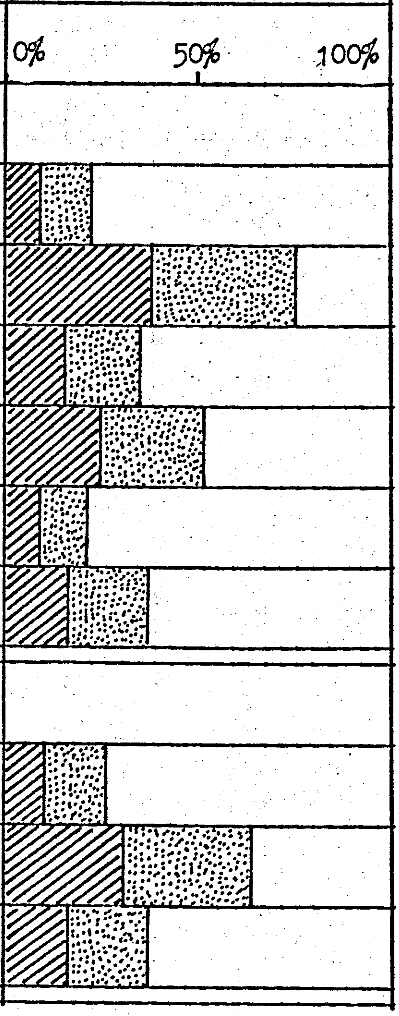
Fig.8.6. shows the extent to which students found the training which they received was related to their college studies, against college course and mode of attendance.

Clearly the training of students in both the O.N.D. and the H.N.D. courses is more related by instructors, to these students college studies than is the training received by O.N.C., H.N.C. and S.F.I.M.L.S. course students.

Fig.8.6.

Distribution of Student Responses concerning the Extent to which Training is Related to College Studies against the College Course and Mode of Attendance they were following.

College Course and Mode of Attendance	Frequency			
	n	%A	%B	%C
College Course				
O.N.C.	51	8	14	78
O.N.D.	29	38	38	24
H.N.C.	54	15	20	65
H.N.D.	29	24	28	48
S.F.I.M.L.S.	39	8	13	79
Total - All Resp.	202	16	21	63
Mode of Attendance				
Day Release	144	10	16	74
Sandwich	58	31	33	36
Total - All Resp.	202	16	21	63



%A = ▨ = % of respondents reporting that training was related A Good Deal or Completely with college studies.

%B = ░ = % of respondents reporting that training was related A Fair Amount with college studies

%C = □ = % of respondents reporting that training was related Little or Not At All with college studies.

This difference is significant where responses of the Sandwich course students collectively are compared with those of Day Release students collectively.

There is no significant difference in the extent to which the laboratory training of students at different levels of study was related to college studies, either in regard to Sandwich courses or Day Release courses.

No significant variation in the distribution of responses concerning the extent to which laboratory training was related to college studies were demonstrable when responses to this question were analysed against employing institutions and against employing departments.

Section 3. The Content of Training Programmes and the Facilities Employed for Training. The Purpose and Adequacy of Training Programmes.

In any in-service training programme it might be expected that the primary aim would be to equip students with the knowledge and skills necessary to perform the tasks which they encounter in their day-to-day work activites. Such essential training would no doubt be enhanced by instruction in the underlying principles, the significance and the value of the procedures employed and also in alternative approaches to the investigations carried out.

In a loosely regulated situation where training appears to be pursued on an essentially casual basis, instructional extensions of this sort may receive limited attention for a variety of reasons.

Pressure of work upon instructors or students might restrict the time devoted to training and the facilities for training might be less than adequate.

Instructors may vary in their enthusiasm towards the training of students and may hold different views with regard to the breadth and depth of training necessary for students who are also pursuing vocationally orientated college courses.

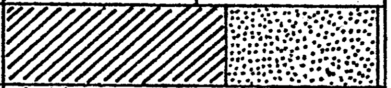
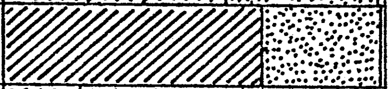
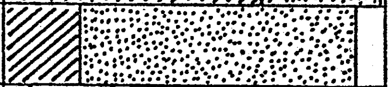
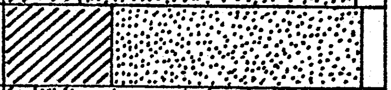
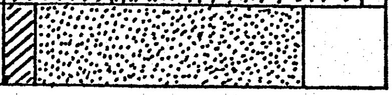
It is with these factors in mind that this section of the survey has been directed towards examination of student opinion and experience of the broad content of training programmes, the facilities which were employed for training, the primary purpose of the training given and its adequacy with respect to time, organisation, instructors, facilities and content.

Fig.8.7. shows the frequency with which certain broad instructional approaches are employed in the training of students.

As might be expected, practical demonstration and instruction in essential practical details are the procedures most commonly reported

Fig.8.7.

Distribution of Student Responses concerning the Frequency with which certain Broad Instructional Approaches were employed in their Training

Type of Instruction	Frequency				
	n	%A	%B	%C	0% 50% 100%
Practical demonstration	206	58	40	2	
Essential practical detail	206	68	31	1	
Theoretical principles	205	20	73	7	
Clinical significance	207	28	66	6	
Alternative techniques	205	8	71	21	

%A = ▨ = % respondents reporting instruction Always received

%B = ░ = % " " " Sometimes "

%C = □ = % " " " Never "

areas of instruction. It may however be thought surprising and even a cause for some concern that 42% of the respondents do not appear to always receive practical demonstration of the procedures which they will use and even more so that 32% of them report that they do not invariably receive instruction in essential practical details of procedures they are required to carry out.

Guidance in the underlying theoretical principles and clinical significance of laboratory procedures appears to be even less consistently provided with more than two thirds of the subjects reporting that attention is given to these aspects only sometimes and in a few instances, never.

Information on alternative analytical techniques and methods appears to have received the least attention during training with a quite substantial proportion of the respondents (42 or 21%) stating that they never received such information.

It was notable that there was no significant variation in these findings when they were viewed against course type (Day Release and Sandwich), against type of employing institution (Teaching Hospital Group and District General Hospital) and against employing department.

It would appear that this pattern of emphasis on the various instructional approaches and also the frequency with which they are employed, are similar in the main types of institutions and in the departments within which the survey subjects were employed, regardless of the level of study and the type of course which they were following.

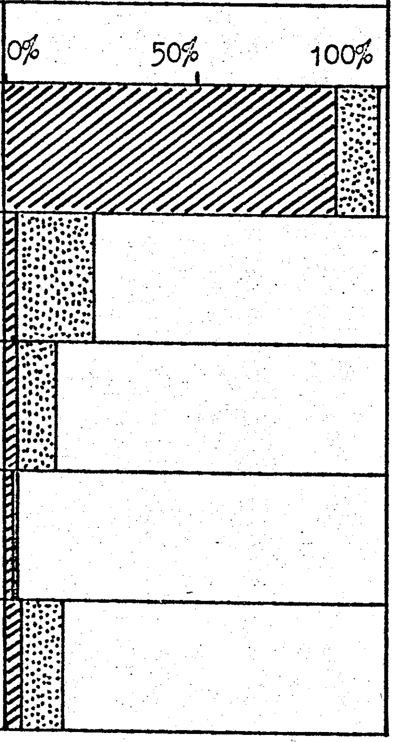
Fig.8.8. shows the distribution of student response to the question concerning the location in which their training was given.

From these findings it is apparent that "the bench" within the working

Fig.8.8.

Distribution of Student Responses concerning the Locations used for their Laboratory Training.

Training Location	Frequency			
	n	%A	%B	%C
At the bench in the working laboratory	209	87	11	2
The office of the senior or chief technician	184	3	20	77
A room set aside for teaching purposes	180	3	10	87
A workroom set aside for practical training	171	2	1	97
Other places	53	4	11	85



%A = ▨ = % respondents reporting location used for All or Most of their training

%B = ▩ = % " " " used for Some of their training

%C = ☐ = % " " " used for Little or None of their training laboratory is where the great majority of the survey subjects (85%) received all or most of their training. The remaining listed locations were reported to be used for training purposes to a far lesser extent with less than 3% of the survey subjects reporting any of these as the site employed for all or most of their training. The senior or chief technicians office was however reported to be used for some training by 23% of the survey subjects and 12% of them stated that they received some training in a room set aside for teaching and instructional purposes.

Only six students (3%) stated that they received training in a work-room set aside for training purposes and eight reported training received "in other places"..

The predominant use of "the bench" in the working laboratory for training purposes was confirmed by only 4 students (2%) recording that they received little or no training in this situation and between 77% and 97% of the respondents reporting that they received little or no training in the remaining locations.

The "other places" in which eight (4%) of the survey subjects said they received training were identified by reference to their completed questionnaires as short courses of training arranged by commercial organisations which produce specialised equipment and materials for medical laboratories and as secondment to other medical laboratories for extension of their practical experience.

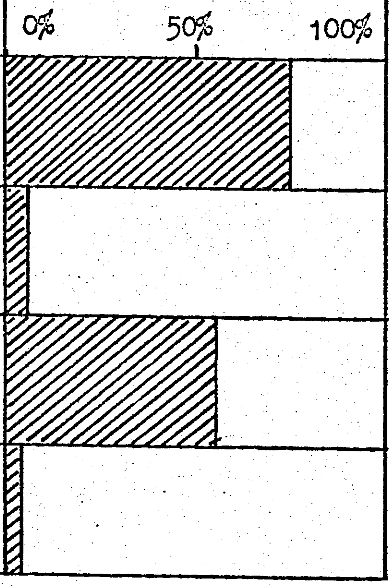
Further analysis of the students responses to this question showed that the extent to which these various locations were used for training did not vary significantly according to course type, employing institution or employing department.

Fig.8.9. shows the distribution of student opinion of the purpose of the training which they received.

Fig.8.9.

Distribution of Student Opinion of the Purpose of the Training which they received

Purpose of Training	Frequency		
	n	f	%
Making you a useful member of the laboratory staff	213	75	35
Developing your knowledge and experience for your career	213	12	6
Training is equally concerned with both the above purposes	213	117	55
Nil response	213	9	4



Rather more than half of the survey subjects (55%) felt that their training was about equally concerned with making them an increasingly useful member of the laboratory staff and with developing their knowledge and experience in the interest of their careers.

A large minority (35%) appeared to consider that their training was specifically concerned with the former of these two objectives while only 6% felt that their training was provided specifically in their own interests.

The distribution of these responses was found to show no significant variation according to the students employing institution and employing department but it was found that a greater number of Sandwich Course students than Day Release students felt that their training was most specifically concerned with developing their knowledge and experience in the interest of their careers.

This is perhaps a predictable finding in view of the fact that Sandwich Course students are seconded to laboratories for training in a supernumerary role with an emphasis on the development of their practical skills in order to meet qualification criteria rather than to make a notable, immediate contribution to the workforce of the laboratory.

Fig.8.10. shows the distribution of student opinion of important features of the training which they receive in medical laboratories.

As the most frequently approved feature of their training - the suitability of instructors - was considered satisfactory by just two thirds (68%) of respondents, none of these features can be said to be highly acclaimed by the survey subjects.

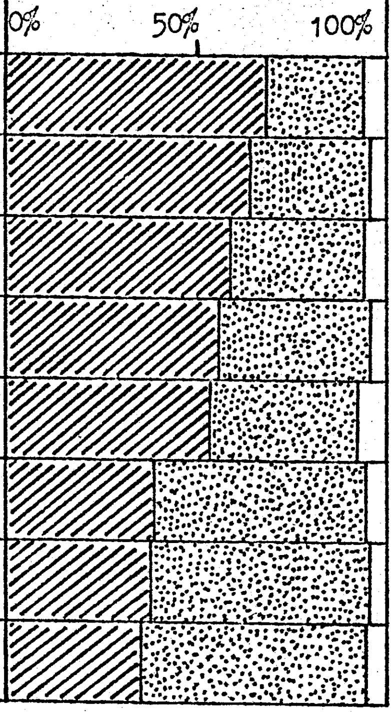
Response patterns for the respective features of training appear to fall into two broad groups.

The first five features were deemed to be satisfactory by more than

Fig.8.10.

Distribution of Student Opinion of Important Features of Laboratory Training

Feature of Training	Frequency			
	n	%A	%B	%C
Their instructors	213	68	26	6
Practical experience	213	64	32	4
The situation employed	213	59	35	6
Clinical instruction	213	56	40	4
Wide knowledge and skills	213	53	40	7
Scientific principles	213	39	56	5
Organisation of training	213	38	58	4
Time allocated to training	213	35	60	5



%A = ▨ = % of subjects who believed feature to be Satisfactory

%B = ▒ = % " " " " " " " Unsatisfactory

%C = ☐ = % " " " gave No response with regard to the the particular feature

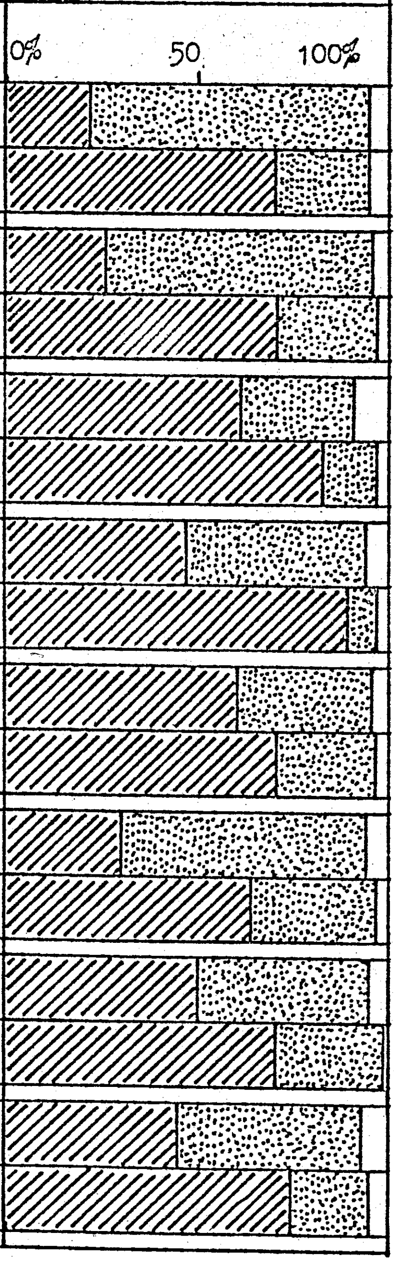
50% of respondents, while the last three features were thought to be satisfactory by less than 40% of the survey subjects.
It is notable that the features of the first group are all ones which could be said to be most typical of an essentially casual, day-to-day work orientated approach to training which previous responses to questions concerning laboratory training arrangements tend to suggest is the prevalent one in the subjects employing laboratories (see Fig.8.3.).
At the same time, the features in the last group might be said to be those which one would expect to be well defined in a formalised training programme but to which less attention would predictably be given in a relatively casual and loosely arranged programme.

Fig.8.11. shows the distribution of student opinion of the same features of the training which they received, against the form of college course which they were attending.
These findings show that all the listed features except one were considered to be satisfactory by significantly more Sandwich Course students than Day Release students.
The fact that the most significant differences in opinion of Sandwich Course students and Day Release students relate to the amount of time alloted to training, its organisation, and the amount of attention given to the understanding of underlying scientific principles, might be seen to indicate that the training received by Sandwich Course students is greater in amount, is more regular and arranged, and is more fully related to their college studies than that received by Day Release students.
Such conclusions are supported by the findings concerning student opinion of these same aspects of training which have been discussed in earlier sections of this chapter.

Fig.8.11.

Distribution of Student Opinion of Important Features of their Laboratory Training against the Type of College Course which they were attending

Feature of Training	Course Type	Frequency			
		n	%A	%B	%C
Time	Day Release	155	22	73	5
	Sandwich	58	71	24	5
Organisation	Day Release	155	26	70	4
	Sandwich	58	71	26	3
Instructors	Day Release	155	62	30	8
	Sandwich	58	83	14	3
Situation	Day Release	155	47	47	6
	Sandwich	58	90	7	3
Practical Experience	Day Release	155	61	35	4
	Sandwich	58	71	26	3
Scientific Principles	Day Release	155	30	64	6
	Sandwich	58	64	33	3
Clinical Importance	Day Release	155	50	45	5
	Sandwich	58	71	28	1
Width of Training	Day Release	155	45	48	7
	Sandwich	58	74	21	5



%A = ▨ = % of subjects reporting feature to be Satisfactory

%B = ░ = % " " " feature to be Unsatisfactory

%C = ☐ = % " giving no response to question

If as appears to be the case, the time devoted to the training of Sandwich Course students is greater than that devoted to the training of Day Release students, and if it is more regular and systematic and more fully related to college studies, it is not surprising that most other aspects of training - the suitability of instructors, the situation in which it is given, and the attention given to the understanding of clinical importance of laboratory investigations and to the provision of wide knowledge and skills - should be seen to be satisfactory by significantly more Sandwich Course students than Day Release students.

The one feature which provoked an exceptional distribution of student opinion concerned the amount of practical experience received during training.

There was no significant difference in the proportions of Sandwich Course students and Day Release students who considered this feature of training to be satisfactory. This is not surprising in view of the fact that the work of the more junior staff within medical laboratories is very largely of a practical nature and all students, whether Day Release or Sandwich, will invariably receive a great deal of practical experience in the on-job situation.

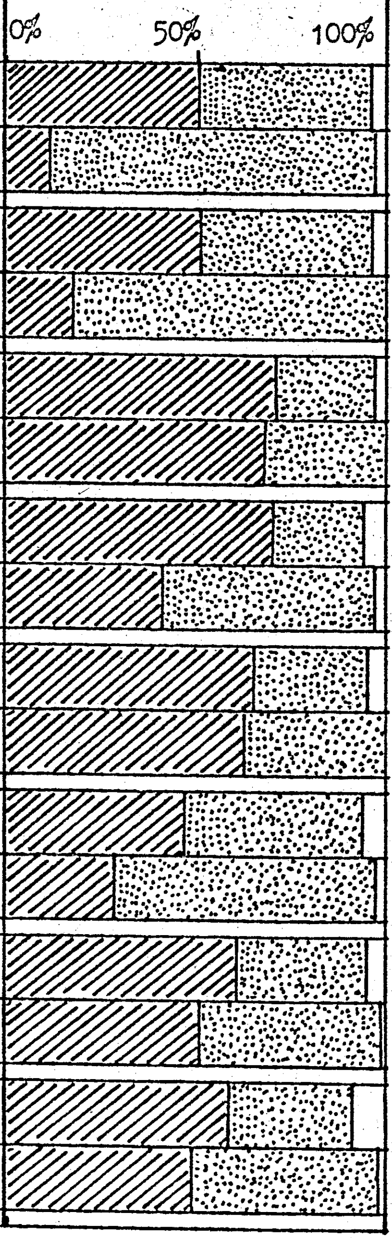
Fig.8.12. shows the distribution of student opinion of the same features of training against type of employing institution.

The findings show that four of the listed features were thought to be satisfactory by significantly more students employed in the Teaching Hospital Group than students employed in the District General Hospitals. It is noteworthy that three of these features - time allocation, organisation of training, and the situation used for training purposes - are those which have already been seen in Fig.8.10. to be least satisfactory to the entire survey population

Fig.8.12.

Distribution of Student Opinion of Important Features of their Laboratory Training against the Type of Institution in which they were Employed or Trained

Feature of Training	Type of Institution	Frequency			
		n	%A	%B	%C
Time	T.G.H.	119	50	46	4
	D.G.H.	65	12	85	3
Organisation	T.G.H.	119	51	45	4
	D.G.H.	65	18	82	0
Instructors	T.G.H.	119	71	26	3
	D.G.H.	65	68	32	0
Situation	T.G.H.	119	70	24	6
	D.G.H.	65	42	55	3
Practical Experience	T.G.H.	119	66	29	5
	D.G.H.	65	63	37	0
Scientific Principles	T.G.H.	119	47	47	6
	D.G.H.	65	28	69	3
Clinical Importance	T.G.H.	119	61	34	5
	D.G.H.	65	51	48	1
Width of Training	T.G.H.	119	58	34	8
	D.G.H.	65	49	49	2



%A = ▨ = % of subjects reporting feature to be Satisfactory

%B = ░ = % " " " feature to be Unsatisfactory

%C = ☐ = % " " giving no response to question and are concerned with the organisation of training rather than its content.

The fourth feature seen to be more satisfactory by significantly more students from the Teaching Hospital Group than from the District General Hospitals, was the amount of attention given during training to underlying scientific principles and although this is more of an instructional feature, it is not difficult to conceive that it is one which would be likely to receive less attention in a relatively casual day-to-day, work orientated training regime.

Upon examining the possible implications of these findings to the training of technicians undertaken in the two major types of employing institution, it was recognised that they may be reflections of the distribution, for training purposes, of students following different course types - Day Release and Sandwich. This has already been shown in Fig.8.11. to be a significant variable with regard to student opinion of the adequacy of these features of training rather than truly indicative of differences of opinion dependant upon the type of institution in which the students were trained.

Responses concerning the four features of training upon which there appeared to be significant differences of opinion according to the type of employing institution, were therefore analysed against type of institution after excluding all those of H.N.D. students who were known to have been trained exclusively within the laboratories of the Teaching Hospital Group.

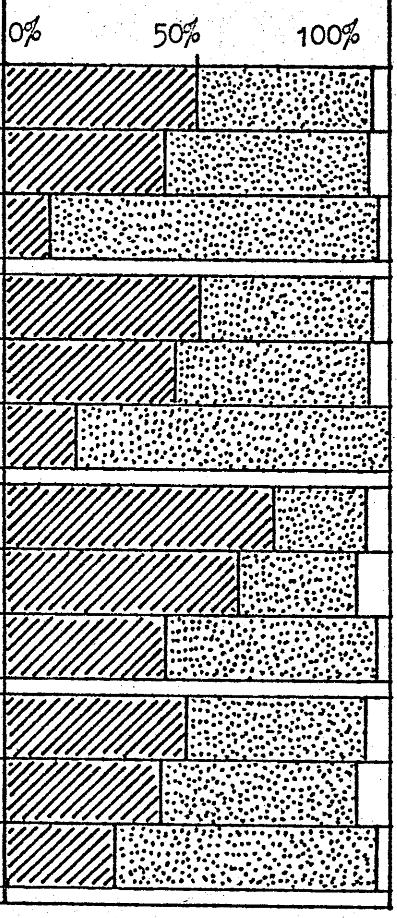
Fig.8.13. shows the results of these analyses.

With the exclusion of the responses of all H.N.D. students, the proportion of students employed in the Teaching Hospital Group who considered the first three features to be satisfactory remains significantly greater than the number of students employed in the District General Hospitals who held the same opinion.

Fig.8.13.

Effect of the Opinions of H.N.D. students upon Significant Differences exhibited when the Opinions of the Survey Population concerning Important Features of their Training are examined against the Type of Employing Institution.

Feature of Training	Type of Institution	Freuuency			
		n	%A	%B	%C
Time	T.G.H.incl.H.N.D.	119	50	46	4
	T.G.H.excl.H.N.D.	90	42	53	5
	D.G.H.	65	12	85	3
Organisation	T.G.H.incl.H.N.D.	119	51	45	4
	T.G.H.excl.H.N.D.	90	44	51	5
	D.G.H.	65	18	82	0
Situation	T.G.H.incl.H.N.D.	119	70	24	6
	T.G.H.excl.H.N.D.	90	61	31	8
	D.G.H.	65	42	55	3
Scientif. Princip.	T.G.H.incl.H.N.D.	119	47	47	6
	T.G.H.excl.H.N.D.	90	40	52	8
	D.G.H.	65	28	69	3



%A = ▨ = % subjects reporting feature to be Satisfactory

%B = ▒ = % " " " " " Unsatisfactory

%C = ☐ = % 2 giving no response to question

With similar exclusion of H.N.D. student responses, the significant difference of opinion between these two groups, concerning the amount of attention given to underlying scientific principles, does not occur.

It would appear that setting aside the opinions of H.N.D. students, the time devoted to training, its organisation and the situation in which it is carried out is considered to be satisfactory by significantly more students employed or trained in the Teaching Hospital Group than those employed or trained in the District General Hospitals.

Student opinion of the remaining features of training - the persons who provide it, the amount of attention given to the understanding of the clinical importance of the work, and the provision of sufficiently wide knowledge and skills - showed no significant variation in relation to the type of institution in which the students were employed or trained.

Students Comments on Laboratory Training

114 (54%) of the survey subjects made comment in response to the open question on laboratory training.

Classification of these responses into a limited number of detailed categories was not undertaken due to the great variety of points of view expressed. Responses have been simply grouped into three broad categories indicating respectively, general satisfaction, essentially neutral comment and those containing specific criticisms.

Predominant or otherwise notable responses in each of these groups are referred to or discussed as seems relevant.

17 (15%) of the respondents expressed general satisfaction with their training. A few simply commented 'satisfactory','very helpful' or 'very adequate' but the majority qualified these opinions with comments which were quite revealing in relation to several issues which this chapter has attempted to explore.

There was a recurrent impression that although 'staff appreciate questions' and 'the attitude of staff at all levels was always helpful and friendly', that 'time is always given for explanation of any problem' and 'medical staff are very approachable', laboratory tuition and training was provided on demand rather than by design. Students are apparently trained in the duties they are actually required to perform. As one student put it 'the work is split up and we are placed in a rota so that we can go around and learn about the different tests'. Another explained, 'we do not have time set aside as such for laboratory training. I suppose experience is gained by doing the routine work - and tuition in this is very good'.

Beyond this, training appears to depend considerably on the initiative of the individual student - as one put it, 'if there is anything you want to know you can always ask', while another reported that 'a lack of interest from students will result in a lack of interest in the student from the laboratory staff'.

30 (26%) of the comments made on laboratory training were essentially neutral ones.

Several, without being particularly critical of the existing training arrangements, made interesting suggestions on how they might be improved. One said''it would be a good idea to have a laboratory set aside for juniors to practice' and another proposed that 'more time should be spent relating our training to college work'. One other student reported optimistically that 'there is no training as yet but a programme is planned for the future'.

Further indications of the "needs and demands policy" emerged from several responses in this neutral group through comments such as 'we are put with other more experienced juniors or technicians who are supposed to show us the job as we go along' and 'in our laboratory the onus is on us to push the senior staff into chairing discussions or giving talks'. Another respondent revealed that 'most of our laboratory training takes place in our own time ie. our lunch hours'.

One particular feature which appeared in several responses in this group was the problems of students employed in highly specialised departments. One explained that 'although his course at college was in clinical chemistry, 'most of his training was in a very specialised field only', while another pointed out that his condemnation in the previous question, of the amount of training he received, applied only to the specialised laboratory in which he worked and not to the department as a whole. A student apparently employed in a research laboratory stated that in his laboratory 'there was not a laid down body of practical work to be learnt' and that 'he had to learn from mistakes and develop procedures that looked promising'.

The majority (67 or 59%) of the students commenting on laboratory training were frankly critical of one aspect or another of its provision and tended to confirm, often in considerable detail, many of the impressions gained from the responses to previous questions concerning laboratory training.

Some simply felt that the time and attention given to training was quite inadequate, commenting with significant brevity, 'most insufficient and 'what training?'.

Many others did however identify specific areas of complaint. Notable amongst these was the conflict between training and the workload of the laboratory. As one student explained with considerable vision, 'in a busy laboratory the main aim is the production of results and because of this, much of the necessary basic training tends to be neglected, which can only have an adverse effect in time to come'.

It was apparent from several responses that training is not only inhibited by the students preoccupation with'production work' but also by the trainers - the more senior staff - being similarly occupied. As one respondent noted 'there is no in-laboratory training simply because there is no time due to pressure of work, especially for qualified staff who have to find time to train O.N.C. and O.N.D. students'.

Staff shortage, as opposed to pressure of work was another often quoted reason for restricted training. It was suggested in one case that 'the laboratory is so short staffed that it is almost impossible to train and this is the fault of the D.H.S.S.' and in another that 'it seems difficult to arrange training in a busy laboratory which is almost always understaffed due to sickness and leave'.

Some students also complained of inadequacy or indifference on the part of senior staff. Several argued that 'there is a lot of apathy on the part of chief and senior technicians with regard to laboratory training for all grades of technicians' while another felt that 'as far as most seniors are concerned we are just machines'.

It appeared from a number of responses that the quality and the amount of training received did depend upon the particular laboratory and the staff concerned. Thus one respondent pointed out that, 'depending who you work for, you may get a large amount of time set aside for training or none at all' and a few questioned the actual ability of senior staff to train effectively, suggesting that 'all the senior staff in my laboratory qualified under the old "Final" system and do not have a great knowledge of the topics in H.N.C. and how they may be applied' and also that 'some of the people passing on techniques are not properly qualified themselves'. Even monetary reward was implicated by one student who revealed that 'in the laboratory I work in, training has stopped because the staff ceased to be paid for it'.

Generally, the criticisms of laboratory training seemed to focus on the irregular and haphazard manner in which it was conducted and its dependence on local circumstances - workload, staffing levels and the willingness and ability of qualified staff to undertake it.

On the credit side, several students seemed to feel that 'what little training we do get is good' and 'if there were more staff and time, people are willing to teach and are very good teachers'.

A few students even felt that 'training on a regular basis is not necessary as you pick things up as you proceed with the job'.

Chapter Nine

Objectives of the Combined Educational and Training Programmes

Introduction

The last two analytical questions in the questionnaire were posed in an attempt to elicit some understanding of student opinion of the respective roles of college studies and in-service training as parts of the total training process.

A list of possible broad objectives of the combined educational and training process were presented and the survey subjects were first asked to indicate how important they considered each to be.

Their views were then sought on the appropriateness of these objectives to the college curriculum and to the laboratory training programme.

As well as indicating where, in the opinion of the students, the responsibility lay for the pursuit of these objectives, it was hoped that responses to this question would also show the extent to which the survey subjects believed that the college and the training laboratory had a joint obligation or no obligation at all, to the pursuit of these objectives.

The second of the two questions concerning the objectives of the combined educational and training process was aimed at the substantive position with regard to the same objectives - where students found them to be actually pursued, and their opinions of the effectiveness of such provision.

The absence of any previously determined framework of reference precludes precise, quantitative comment on the findings.

In order to complement the essentially qualitative comments on notable and obvious trends and distributions, tables illustrating the findings concerning these questions have been juxtaposed and discussion has been pursued accordingly.

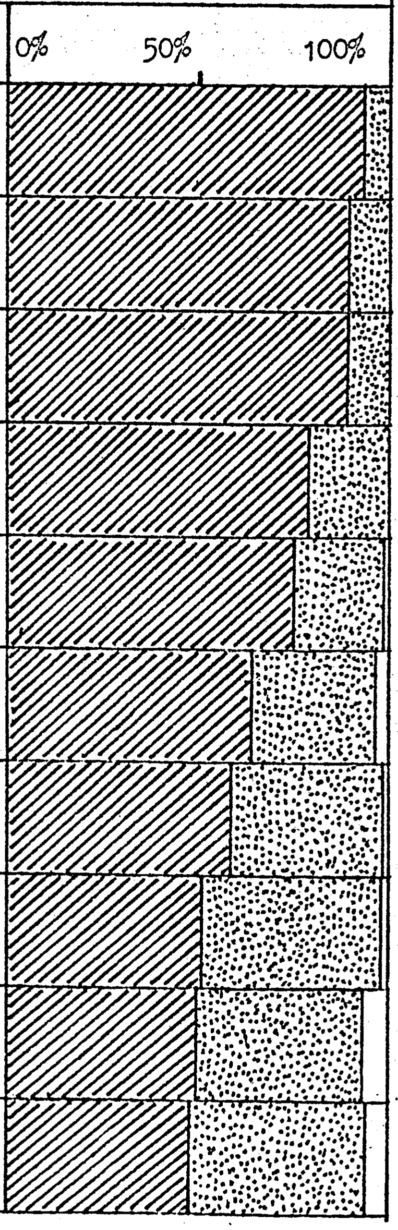
Fig.9.1. shows the distribution of student opinion of the importance of the listed objectives. While these were arranged in the questionnaire in a random order in an attempt to minimise bias, they are presented in Fig.9.1. in order of student-rated importance. The first four of these, rated as very important by between 78% and 93% of the respondents, appear to be those objectives which are most closely associated with the subjects day-to-day work activities. The last five objectives, thought to be very important by between 48% and 64% of the respondents, might be seen as objectives which are more concerned with the broader and long term needs of the students.
The importance rating of "qualifications of value to the students careers" falls, perhaps significantly, between these two groups of objectives with 75% of the respondents considering it to be very important.

Fig.9.2. shows the distribution of student opinion of the effectiveness with which the listed objectives were pursued.
With the response choice that was provided for this part of the question, it might be reasonable to have expected an essentially symmetrical distribution of responses. It is apparent however that responses relating to the first four objectives, which it has been suggested are those most closely associated with the students day-to-day work activities, and also those relating to "qualifications of value to the students careers", are distinctly skewed to the left - that is tending to show approval rather than disapproval of

Fig.9.1.

Distribution of Student Opinion of the Importance of Objectives of the Combined Educational and Training Programmes

Possible Objectives	Frequency			
	n	%A	%B	%C
Knowledge and understanding of work procedures	209	93	7	0
Development of practical skills	208	89	11	0
Use of judgement and initiative in work	207	89	11	0
Understanding of medical significance of the work	209	78	22	0
Qualifications of value in the career	207	75	24	1
Application of scientific principles to work problems	208	64	33	3
Knowledge and understanding of relevant basic science	211	59	40	1
Knowledge of developments in biomedical science	207	52	46	2
Continued social development	200	50	43	7
Development of general education	206	48	46	6



%A = ▨ = % respondents considering objective Very Important

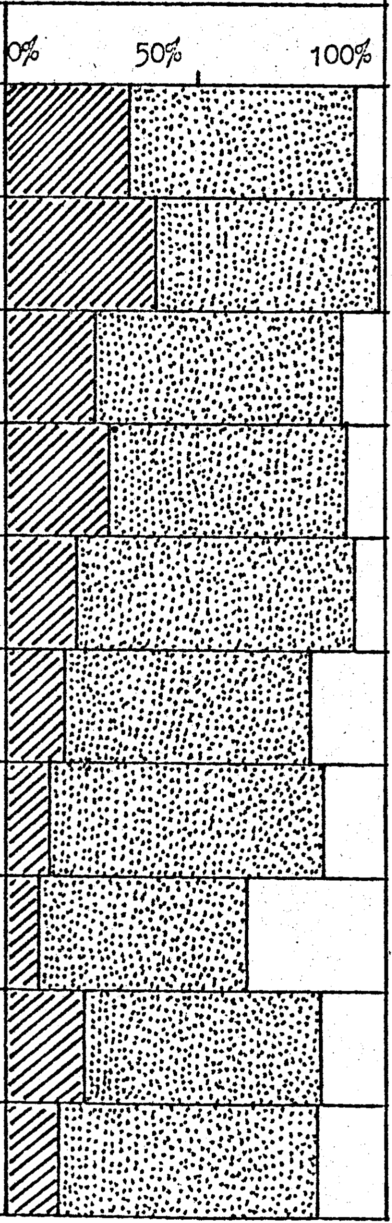
%B = ░ = % " " " Fairly Important

%C = ☐ = % " " " Not Important

Fig.9.2.

Distribution of Student Opinion of the Effectiveness with which Objectives of the Combined Educational and Training Programmes were Pursued

Possible Objective	Frequency			
	n	%A	%B	%C
Knowledge and understanding of work procedures	199	32	60	8
Development of practical skills	199	39	60	1
Use of judgement and initiative in work	195	23	65	12
Understanding of medical significance of work	198	27	62	11
Qualifications of value in the career	193	18	74	8
Application of scientific principles to work problems	192	15	65	20
Knowledge and understanding of relevant basic science	203	12	72	16
Knowledge of developments in biomedical science	189	8	55	37
Continued social development	173	20	63	17
Development of general education	187	14	68	18



%A = ▨ = % respondents considering objective pursued Very Effectively

%B = ░ = % " " " " Fairly Effectively

%C = ☐ = % " " " " Not Effectively

the effectiveness of the pursuit of these objectives.

While it may be questionable whether any absolute significance can be reliably attached to such trends, there is a significant difference between the distribution of these responses and that of the responses concerned with all the remaining objectives except that of "continued social development".

The distribution of opinion on these latter objectives, which tend to be less directly concerned with day-to-day work activities, show a modest but consistent skew to the right, indicating less regard for the effectiveness of the pursuit of these objectives.

The distribution of responses concerning the students "continued social development", which would seem to have little direct relevance to the technicians normal work, is exceptional in that it is skewed slightly in the same direction - towards approval - as those objectives which can be more directly related to actual work activities. A possible explanation of this apparent anomaly is suggested in the discussion of the findings shown in Fig.9.3.

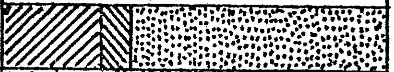
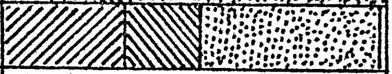
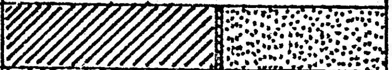
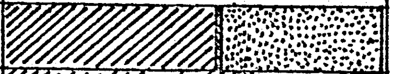
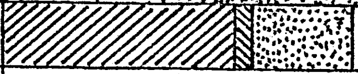
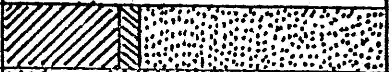
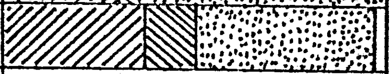
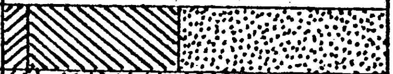
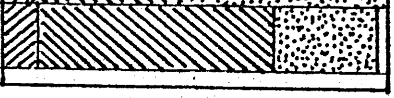
Fig.9.3. shows the distribution of student opinion on where the listed objectives should be pursued and also on where they are actually pursued.

The distribution of response concerned with where the students felt the various objectives should be pursued appears to show some correlation with the broad groupings of objectives suggested by the importance ratings presented in Fig.9.1.. There is a quite distinct tendancy towards the belief that the first four objectives - those that have been directly related to the students day-to-day work activities - should be pursued during laboratory training rather than as a part of college studies.

On the other hand, most of the remaining objectives are believed to

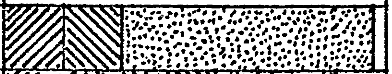
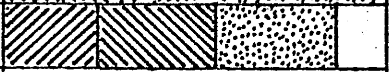
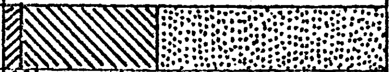
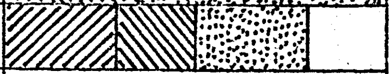
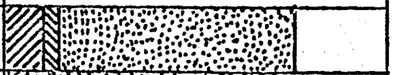
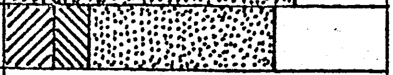
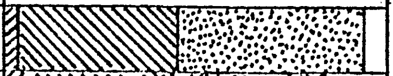
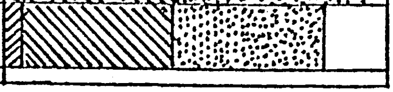
Fig.9.3.

Distribution of Student Opinion on Where the Objectives of the Combined Educational and Training Programmes Should Be Pursued and Where they are Actually Pursued

Possible Objective	Frequency					
	n	%A	%B	%C	%D	0% 50% 100%
Knowledge and understanding of work procedures						
Should be pursued	209	26	7	67	0	
Actually is pursued	201	32	20	46	2	
Development of practical skills						
Should be pursued	208	56	1	43	0	
Actually is pursued	201	62	5	31	2	
Use of judgement and initiative in work						
Should be pursued	204	56	1	42	1	
Actually is pursued	198	62	4	26	8	
Understanding of the medical significance of the work						
Should be pursued	209	30	6	64	0	
Actually is pursued	202	37	13	47	3	
Qualifications of value in the career						
Should be pursued	205	7	39	54	0	
Actually is pursued	198	9	62	27	2	

(continued on page 283)

Fig.9.3. (continued from page 282)

Possible Objective	Frequency					
	n	%A	%B	%C	%D	0% 50% 100%
Application of scientific principles to work problems						
Should be pursued	207	16	15	66	3	
Actually is pursued	201	24	32	31	13	
Knowledge and understanding of relevant basic science						
Should be pursued	209	4	36	60	0	
Actually is pursued	204	8	65	22	5	
Knowledge of developments in biomedical science						
Should be pursued	205	13	22	63	2	
Actually is pursued	198	29	21	29	21	
Continued social development						
Should be pursued	197	10	4	61	25	
Actually is pursued	187	13	9	48	30	
Development of general education						
Should be pursued	206	3	42	48	7	
Actually is pursued	196	4	40	39	17	

%A = ▨ = % respondents citing Laboratory as desirable or actual location

%B = ▧ = % " " College " " "

%C = ░ = % " " Laboratory and College " "

%D = ☐ = % " " Neither Situation " "

have their place in college studies by substantially more students than believe them to be in the domain of laboratory training.

Distribution of opinion appears to be exceptional in the case of two of the listed objectives. Responses concerning the most appropriate location for the pursuit of " ability to apply scientific principles to problems you meet in work" advocated a college liability and a training liability almost equally.

Student opinion with regard to the most appropriate place for "continued social development", while indicating a predominant belief that it is rather more of a laboratory training responsibility than a college function, shows that a substantial proportion of the respondents (25%) considered it an objective which was not appropriate to either sphere of instruction.

One further and perhaps crucially significant feature of these findings is that for every one of the listed objectives, a large proportion of the respondents (from 42% to 67%) were of the opinion that they should be pursued in both situations - college studies and laboratory training - rather than in only one or the other.

The distribution of responses concerned with where, in the students experience, the listed objectives were actually pursued, yields a pattern of opinion which exhibits a very regular relationship to their responses concerning where such objectives should desirably be pursued.

In almost every instance the numbers of students reporting the actual pursuit of each objective, either in laboratory training or in college studies, significantly exceeds the number of students who considered that objective appropriate to the particular situation.

The only two exceptions to this pattern were concerned with the pursuit of of "knowledge of new developments in biomedical science" and "development of students general education" at college. Here the numbers of students reporting actual pursuit of these two objectives were virtually the same as the number advocating their pursuit in college.

In contrast to these findings, the numbers of students who reported the actual pursuit of each objective in both laboratory training and college studies were in every case less than the number of students who considered pursuit of the objectives appropriate to both situations - laboratory training and college studies.

The number of students who reported that pursuit of the listed objectives did not occur in laboratory training or in college study was consistently greater than the number of students who were of the opinion that the objectives were inappropriate to college studies and to laboratory training. In three instances relating to "ability to apply scientific principles to problems in your work", "knowledge of new developments in biomedical science" and "your continued general education", this difference in response was in excess of 10%.

Chapter Ten

Students Final Comments

The questionnaire ended with an open question inviting comment on any aspect of, or item in the questionnaire, so providing opportunity for comment on points which although not specifically dealt with in previous questions, might still be of value in this study. A terminal question of this sort would also allow the subjects to state views on the content and structure of the questionnaire, any difficulty they found in answering its questions, and might also reveal attitudes to the survey which although retrospective, would be of value in any future investigations involving similar instruments.

48 (23%) of the subjects responded to this question with comments that fell into four categories concerning: the questionnaire itself and in broader terms, the survey; laboratory training; college studies; certain general issues.

The few comments in the last category expressed concern for 'more effective publicity for the career and associated courses', for the setting up of a 'proper governing body' to 'prevent the profession from going downhill' and for the 'little care shown towards the social development of staff'.

The largest number of respondents to this question (20 or 9%), commented on various aspects of college courses and study, most of which were dealt with in previous sections of the questionnaire and discussed in earlier chapters of this report.
The point raised by the majority of these students was the apparent irrelevance of much of their college study to their work, while one

or two students questioned the inclusion of homework and classwork marks in final assessments, advocated the issue of syllabuses, the reduction of their Day Release study time, increase of private study time, argued for Block Release courses in preference to Day Release and for 'some sort of liaison between lecturers and training supervisors so that the most can be made of the teaching in both work and college'.

Only 8 (4%) of the students made comments pertaining to laboratory training. All were concerned with various alleged inconsistencies in the provision of training, especially for those who had already moved some way up the career ladder. Several students of the Fellowship course in particular, felt that chief technicians should give them more attention so that those who had entered the career after taking a degree might rapidly make good their deficiencies in laboratory experience.

16 (8%) of the survey subjects made comments relating to the questionnaire itself in terms of its content, format and structure and to the purpose and value of the survey generally.
Two students took obvious exception to adding their names to a voluntary questionnaire although it had been made clear in writing and verbally that this was only required for clerical checking purposes and that anonymity would be scrupulously protected, one "on the grounds that it may be detrimental to his future career'. the same student went on to give an assurance that 'I have however answered the questions honestly and to the best of my ability'.
Another student felt that the questionnaire should rightly have been directed at students other than Fellowship students 'because many of the questions relate to practical training which is largely

completed by Fellowship'.

All but one of the remaining responses were divided almost equally between criticism and approval of the questionnaire or the survey. The main criticisms were that some questions 'were ambiguous and difficult to give definite answers to'. One student suggested that 'there were too many Yes/No questions' while another pointed out that 'a lot of the questions do not allow for border-line opinion and a Yes/No option does not always reflect the true opinion'. One subject believed that 'not enough detail was asked for on each separate subject".

The approving responses to this question tended to be couched in general terms such as 'I hope it works for you' and 'the survey appears to be a worthwhile exercise', although a few students qualified such broad comment with more specific observations such as 'a very good idea having this questionnaire, I'm glad you care. On the whole I have learned far more by attendance at college than through work'. Other comments in this vein were 'the questionnaire, although at times rather complicated, gives one a chance to express personal views - thanks' and 'a worthwhile project. It is very encouraging to see an interest being taken in the education of students. I hope the comments and answers will be valuable'.

The remaining students among the respondents to this question chose a rather hostile manner to express what was eventually a valid point of view suggesting that 'it seems quite unnecessary. Why not give it to our employers, they would (and you) benefit from it quite a lot. A greater liaison should be made between the two'.

Chapter Eleven

Summary and Discussion

Contents

Section 1. Summary of The Research Problem and the Methodology Employed

The central issue which has been pursued in this investigation has been summarised by the question "how can the present arrangements and provisions for the education and training of medical laboratory technicians be made more effective?".

While this is a question which would probably merit investigation when directed towards any sector of education or vocational training, the circumstances surrounding the education and training of medical laboratory technicians at the present time are such that investigation of this field is felt to be of particularly compelling importance. Almost every aspect of medical laboratory technology has been subject, during the years between 1962 and 1976, to extensive evolution and innovation.

The nature of the occupation has been substantially changed as a consequence of development in medical knowledge, diagnostic procedures and analytical technique. This has created a need for technicians with greater knowledge, new skills and wider experience.

To meet this need, new courses of vocational education have been established and systematic programmes of laboratory training have been recommended. Processes of professional qualification and certification to practise have been re-defined, and responsibilities for the design, operation and control of educational courses and of training programmes have been firmly established.

The many changes and innovations which have been brought about, appear to have reached a stage of maturity and at least temporary stability, and may be considered to have completed a cycle of curriculum development. The investigation has therefore been pursued as a situational analysis which may provide some answers to the question "how can the present arrangements and provisions for the education of medical laboratory technicians be made more effective", and in this way contribute to further development and improvement.

Viewed in this way, the investigation resembles the initial stage which Skilbeck M.(1976) proposed in his Model for Curriculum Development, and the analytical framework which has been adopted draws considerably upon the Skilbeck approach.

In developing the investigation as a situational analysis, it has been necessary to reconcile the need for a comprehensive portrayal with practical constraints and to attain a balance of breadth of view and depth of study. Attention has therefore been focused upon the factors on which the effectiveness of the existing arrangements and provisions is most likely to depend. These are seen to be; the major characteristics of the students themselves, the structure and content of courses of academic study, the content and mode of operation of laboratory training, the relationship between college studies and laboratory training.

Examination of these factors reveals certain prominent variables which may be important determinants of the effectiveness of the present arrangements and provisions.

Recruits may enter the profession at three different levels, and their academic studies are arranged in three distinct stages and may be pursued by either of two modes of college attendance.

They are employed or trained in a variety of institutions and departments within which policies or practices relating to training may differ considerably.

In order to acquire some understanding of the parts which these variable features may play in the education and training of medical laboratory technicians, the descriptive approach adopted for the analysis of the situation has therefore been supplemented by an explanatory element in which these features are examined as explanatory variables.

Descriptive and explanatory information has been collected by survey of a group of medical laboratory technicians with direct knowledge and personal experience of college study and laboratory training.

The chosen population comprised all students who attended courses in medical laboratory technology at a regional College of Technology during the academic year 1975-76. The survey population was fully representative in respect of the various types of course and levels of study and included students employed in different departments of several institutions, thus permitting study of the influence of these factors as explanatory variables.

Data was collected by means of a questionnaire which sought factual information and opinion by the use of closed and open questions.

Approval of the investigation was obtained from the employers of the survey subjects and the questionnaire was completed during students' normal attendance at college.

All the respondents, with the exception of absentees, were surveyed during a single week at the end of the academic year 1975 -76.

Responses in the completed questionnaire were translated to a digital form, entered on punch-cards, and stored in a computer file. The stored data was withdrawn and analysed by the use of a computer programme designed for this explicit purpose.

Findings were presented in a tabular form as percentage values and histograms.

Discussion was based upon the descriptive findings and upon exploration of relationships between the reponses obtained and the chosen explanatory variables, tested by the use of the chi-squared statistic.

Section 2. Summary of the Major Findings

Chapter 4. The Characteristics of the Survey Population

The Size of the Survey Population

Of the 233 students attending the courses from which the sample was drawn, 213 returned completed questionnaires. This number constituted 1.6% of the national population of medical laboratory technicians and 3.7% of those in training in England and Wales.

The 213 respondents also constitute 27% of the total population of medical laboratory technicians in Wales and 65% of those in training in Wales.

The Age, Sex and Marital Status of the Survey Population

The survey subjects all fell within an age range of 16 to 29 years with a mean age of 21 years.

Slightly more than half (54%) of the survey population were male.

22.5% of the survey population (23.7% male, and 21.2% female) were married.

College Courses

The survey population included student groups representing all levels of Day Release and Sandwich courses in medical laboratory technology which operate in England and Wales.

Block Release courses in medical laboratory technology were not represented.

Qualifications held by the Survey Population

(a) Almost all(94%) of the survey subjects held sufficient G.C.E. 'O' Level passes to obtain entry to the career on this basis, and 68.5% of the survey subjects did in fact enter the career by presenting appropriate G.C.E. 'O' Level qualifications. The mean number of passes held at this level was seven.

(b). Only 4.2% of the survey subjects held sufficient C.S.E. Grade I passes to qualify for entry upon this basis alone.
16.4% of the subjects did however hold some C.S.E. Grade I passes and these may have contributed, with G.C.E. 'O' Levels, to their meeting the necessary minimum qualifications for entry.

(c). 27.7% of the survey subjects held G.C.E. 'A' Level passes sufficient to qualify them for direct entry to H.N.C. or H.N.D..

(d). Ten (4.7%) of the survey subjects held a university degree which would have permitted them entry to the career at the post-H.N.C./D. level.

(e). Entry to the career by possession of qualifications other than C.S.E, G.C.E. 'O' Level, G.C.E. 'A' Level and university degree was made by ten (4.7%) of the survey subjects. Of these, seven (3.3%) held O.N.C. in elective subjects other than Medical Laboratory Sciences (Chemistry or Biology), and two (0.9%) had completed the General Course in Science - presumably because of deficiency in the number of G.C.E. 'O' Levels or C.S.E Grade I passes held. One subject had attained S.R.N. qualification prior to entry.

The Employing Institutions

The survey population was made up of technicians from eleven hospital laboratories, one regional Blood Transfusion Centre and an unknown number of miscellaneous institutions. Five of the hospital laboratories are within a teaching hospital group while the remaining six are located in separate District General Hospitals.

The survey population included 42% of the medical laboratory technicians in training at National Health Service laboratories in Wales, and 24% of the total population of technicians employed in National Health Service laboratories in Wales.

The Employing Departments

More than 75% of the survey subjects were almost equally distributed between three of the four main types of department in hospital laboratories - Clinical Chemistry, Haematology, Microbiology.

The fourth main type of hospital laboratory - Histopathology - accounted for 12.2% of the subjects while four (1.9%) were employed in the Regional Blood Transfusion Centre. Fifteen (7.0%) of the survey subjects were employed in unidentified departments outside the National Health Service.

Previous Employment in Other Occupations

34 (16%) of the survey subjects reported having had at least six months experience in other occupations prior to entering medical laboratory technology.

30 (14%) of these had been employed outside the Health Service - 13 (6.1%) in laboratory-type occupations and 17 (8.0%) in non-laboratory type of occupation.

Of the four students who had been previously employed within the Health Service, 3 (1.4%) had been in a patient-care type of occupation.

Chapter 5. Entry to the Career

Career Guidance

(a). All the sources of advice and guidance listed in the questionnaire were consulted by some students.

Parents and relatives were the most commonly consulted sources, providing information for 148 (69%) of the survey subjects.

Teachers and Youth Employment Officers advised 125 (59%) and 115 (54%) of the subjects respectively.

Advice from potential employers was received by 76 (36%) of the survey population and 73 (34%) obtained advice from colleges.

Books and newspapers were consulted by 110 (52%) of the subjects, while 88 (41%) received advice from their friends. 87 subjects (41%) sought guidance at careers conventions.

(b). Parents and relatives were found to be helpful by almost all (95%) of students who consulted these sources.

For the remaining listed sources, a substantial proportion of the students who received advice - ranging from 64% in the case of career convention to 87% in respect of guidance from books and newspapers - found it to be helpful.

(c). On average, the survey subjects appear to have consulted between three and four of the listed sources prior to entry to the career, and these sources had a mean helpfulness of 80%.

Job Expectations

(a). 136 (64%) of the survey subjects found their experience of work to be exactly or mostly as they expected, and 64 (30%) found the work to be somewhat as they expected. 11 (5%) felt that the work that they did in medical laboratories was not as they expected.

(b). The extent to which the survey subjects' experience of work compared with their expectations was not significantly related to either the qualifications which they held on entry to the career or to the college course which they were pursuing at the time of the survey.

Choice of Employing Institution

(a). For Day Release students, who were already in full-time employment, the availability of a job was the predominant factor and influenced 68 (43%) of these students in their choice of an employing institution. 28 (17.6%) chose their job because they thought the particular institution would be a good place within which to work, while for 20 (12.6%) students, the choice was based upon a favourable impression obtained on a school visit.

16 (10.1%) of the Day Release students were primarily influenced by the nearness of the employing institution to their homes.

By the nature of their responses, most of the 27 (17%) of the survey subjects who specified other reasons for their selection of an employing institution, appeared to have misunderstood the question. Three of these students associated their choice with favourable experience of laboratory training while pursuing an O.N.D. course.

(b). For students pursuing Sandwich courses (O.N.D. and H.N.D.), an institution being a good place to work was the primary factor which determined the choice of employing institution for 40 (67%) students.

13 (21.7%) stated that good promotion prospects would be the main consideration in their choice while 7 (11.6%) felt that the employing institution being within easy reach of their homes would be the most important factor influencing their choice.

Conditions of Work

(a). When questioned in an open form upon the attractive and unattractive features of their jobs, 212 (99.5%) of the survey subjects referred to various attractive features, and 171 (80%) cited certain unattractive features.

More than twice as many references were made to attractive features than were made to unattractive features of the students' jobs.

Of the attractive features which were specified, those of an intellectual nature accounted for half and of these, the "interesting nature of the work" was predominant.

The most frequent references to unattractive features were concerned with the "boring and routine nature of the job".

(b). When asked to compare their working situations with those of their friends in other occupations, the majority of the survey subjects viewed their own jobs as better than, or the same as, the jobs of their friends.

Some features of the job, most notably "opportunities to improve qualifications", "security", and "intellectual stimulation" were felt to be better by a substantial majority of the subjects.

Responses relating to "amount of work and working hours", "pressure of work" and "present salary" showed an essentially normal distribution while "salary scale as a whole", position as a whole including salary" and "position as a whole excluding salary" were thought by most of the survey subjects to be better than those of their friends.

(c). The students' views of their working situation compared with those of their collegues employed in other medical laboratories were essentially neutral with a more or less normal distribution of response. Responses relating to "faciltities and equipment available" and "interest and variety of work activities" were exceptional in that they showed a significant tendancy towards the belief that the subjects enjoyed better conditions in these respects than did their collegues in other laboratories.

Chapter 6. Membership of the Professional Body

The Distribution of Students holding I.M.L.S. Membership

(a). 83 (39%) of the survey subjects were members of the I.M.L.S.. The proportion of the subjects who were I.M.L.S. members varied in the different course groups from 10% (O.N.D.) to 100% (Fellowship course).

(b). The frequency of I.M.L.S. membership among students in the O.N.C., O.N.D. and H.N.C. courses was not significantly different but the frequency of membership among H.N.D. students was significantly greater than that of students in O.N.C., O.N.D. and H.N.C. courses. All the survey subjects attending the Fellowship course were members of the I.M.L.S..

(c). I.M.L.S. membership among students employed in the laboratories of the teaching hospital group (46%) was significantly greater than the frequency of membership among those employed in the laboratories of the District General Hospitals (29%). Frequency of I.M.L.S. membership among students employed in laboratories outside the Health Service is closely similar to the mean frequency of membership for the total survey population.

(d). There was no significant difference in the frequency of I.M.L.S. membership between students employed in the four main types of department in hospital laboratories.

Encouragement to Join the I.M.L.S.

(a). 117 (55%) of the survey subjects had received encourangement to join the I.M.L.S. If this statistic is held against the percentage of the survey population which actually held membership, the encouragement given would appear to be 71% effective.

(b). The frequency of encouragement to join the I.M.L.S. increases as the level of the courses which students were attending advances. The frequency of encouragement to join the I.M.L.S. reported by H.N.D. students is significantly greater than that reported by all other students in the survey population.

(c). Comparison of the frequency of encouragement to join the I.M.L.S. reported by students attending the respective courses (O.N.C., O.N.D., H.N.C., H.N.D.), with the frequency of actual membership within each of those courses, shows that the effectiveness of such encouragement is greater for H.N.D. students (59%) than for O.N.C., O.N.D. and H.N.C. students (39 - 42%).

(d). Students employed in the laboratories of the University Hospital of Wales appear to receive significantly more encouragement to join the I.M.L.S. than do students employed in all other laboratories.

(e). Between the four main departments within medical laboratories there is no significant difference in the frequency with which students receive encouragement to join the I.M.L.S.
The frequency of encouragement to join received by students in institutions outside the Health Service is significantly lower than that reported by the remainder of the survey population.

The Students' Views of I.M.L.S. Membership

143 (67%) of the survey subjects responded to an open question upon the merits of I.M.L.S. membership by citing a variety of attractive

and unattractive features.

Information upon scientific topics and employment, the role of the I.M.L.S. in professional qualifications, and professional representation, were seen to be important attractions of membership by many of the survey subjects.

A small number of students considered local activities, organised by the I.M.L.S. to be of particular value.

Comments upon unattractive features of I.M.L.S. membership were largely focused upon the rates of subscription and the cost-benefits of membership.

Responses to this question revealed a considerable number of major misconceptions and a significant degree of ignorance of the purpose, structure and function of the I.M.L.S..

Chapter 7. College Studies

Courses and Attendance

(a). A proportion of students in all courses showed a preference for a mode of attendance other than that of the course which they were following. This preference was shown by the majority (53%) of students pursuing the Fellowship Course, and a significant minority of students in all other courses.

(b). Preferences for modes of attendance other than those being followed by the respondents were very notably inclined towards a Block Release mode in the case of both Day Release and Sandwich Course students.

(c). Preferences for particular modes of attendance appear to be determined mainly by: the quality and effectiveness of the provisions for study; the extent to which the mode of attendance facilitates co-ordination and relating of college studies and laboratory practice; the compatability of the various modes of attendance with the exigencies of the hospital laboratory service.

Course Information

(a). The large majority of students believed their knowledge to be adequate and information readily available on course arrangements and examination and qualification conditions and criteria. With respect to course arrangements and information, this belief is held by significantly more Sandwich Course students than Day Release students.

(b). For all students, course tutors and subject lecturers are jointly the most predominant sources of course information and Sandwich Course students appear to depend significantly more upon course tutors and less upon subject lecturers.

(c). The majority of students receive ample, immediate advice and guidance when it is requested, Sandwich Course students seemingly being significantly better served in this respect than Day Release students. Very few students received no assistance when it was requested.

(d). In open comments on course arrangements and examination and qualification conditions and criteria, there was a considerable degree of moderate satisfaction.
Notable anxiety was expresses about the relevance of subject material to the students' work(13%) and about the relating and integrating of associated subject areas (14%).

(a). <u>Time Allocation to the Main Subject Areas</u>.

i. Almost half (47%) of all the survey subjects considered that too much time is allocated to the study of supportive sciences and this belief is significantly more prevalent among Day Release students than it is among Sandwich Course students.

ii. More than half (63%) of all students felt that insufficient time is allocated to specialised, applied subjects and this view was held by significantly more Day Release students (75%) than by Sandwich Course students (33%).

iii. Almost half (47%) of students whose courses included an obligatory element of General Studies considered the time allocation to this subject to be excessive. The large majority (74%) of these were Day Release students.

(b). <u>Teaching and Learning Activities</u>. .

i. All the identified teaching and learning activities appear to be employed to a considerable extent, determined probable by appropriateness and need. All except practical projects were considered to be helpful by most respondents. Almost a quarter (24%) of the students surveyed considered projects to be an unhelpful activity.

ii. A significant proportion of students felt that insufficient time was devoted to all the listed teaching and learning activities except lectures and practical projects. With regard to visits to specialised laboratories and visiting specialist lecturers, this view was held by 60% and 72% of respondents respectively.

iii. Up-to-dateness of information, relating of study topics to work and constructive criticism of course work were curricular features of supportive science and specialised applied subjects which were rated as important by the very large majority of respondents.

A majority (57%) were however dissatisfied with the extent to which study topics in supportive sciences were related to their work.

Breadth and depth of information were considered very important by a large majority of survey subjects - 74% and 72% respectively. An appreciable number thought homework (28%) and practical projects (39%) to be of no importance in the context of supportive sciences and almost a third (32%) of the respondents considered practical projects in the specialised applied subjects to be of no importance.

Overall, the survey subjects appear to believe that the curricular features listed are of less importance and are less well provided for in the supportive sciences area than they are in the specialist applied subject area.

iv. There was evident concern among students about what they consider to be irrelevant material in their study programmes and also over the relating and co-ordination of study areas. The more extensive use of teaching aids and methods other than formal lectures would clearly be welcomed by many students.

(c). College Facilities.

i. The listed study facilities at the college were thought at least adequate by 71% or more of the survey subjects while Student Union facilities were rated as poor by more than half (56%) of the subjects.

ii. Accomodation and laboratory facilities and equipment were considered satisfactory by significantly more Sandwich Course students than Day Release students. Opinion of these facilities did not differ significantly according to level of study.

iii. Library facilities were also felt to be satisfactory by significantly more Sandwich Course students than Day Release students and this facility was also held to be satisfactory by more students in the lower level courses than in courses at the higher levels.

iv. Student Union facilities were seen as unsatisfactory by significantly more students of the Day Release courses than of Sandwich courses.

v. Criticism of academic facilities was mainly centred on discomfort in lecture rooms due to poor desk and seat design, on the apparently common practice of holding lectures in laboratories which are unsuited to this purpose and on the inadequacy and obsolescence of laboratory facilities and equipment.

Library accomodation was praised for the study facilities it provided, but was criticised for a paucity of books, particularly those concerned with the specialised applied subjects.

Day Release students appear to have limited time in which they may use the Library.

vi. The Students Union was severely criticised with regard to the conditions, cost and quality of food in the refectory and the dearth of leisure and relaxation facilities.

Chapter 8. Laboratory Training

The Amount and Regularity of Training

(a) No time appears to be specifically set aside in an average week for laboratory training of the majority (51%) of the survey subjects. The remainder report receiving about equally, from less than one hour, to more than three hours of training per week.

(b) The amount of time set aside for training varies according to the type of course to which students are committed with Sandwich Course students reporting significantly more time set aside for their training than Day Release students.

(c) The amount of time devoted to training appears to be greater in the Teaching Group Hospitals than in the District General Hospitals but this significant difference seems to be due to a greater amount of training being given to H.N.D. students who are trained exclusively in the Teaching Group Hospitals.

(d) The time set aside for training of students in "Other" institutions does not appear to differ significantly from that reported by students trained in the Teaching Group Hospitals and the District General Hospitals, other than H.N.D. students.

(e) The form of the training received by the survey subjects was predominantly spontaneous and irregular but Sandwich Course students appear to have received training which was more regular and arranged and less spontaneous and irregular than that received by Day Release students.

(f) Students trained in the Teaching Group Hospitals appear to receive training which is significantly more regular and arranged than that received by those trained in the District General Hospitals. This difference is independant of training provision for H.N.D. students, who were trained exclusively in the Teaching Group Hospitals.

Training Personnel, the Extent and Manner of Instruction, and the Relating of Training to College Studies

(a) The greater proportion of student training appears to be provided by the qualified technical staff of laboratories, largely irrespective of their grade or position.
Graduate staff - medical and non-medical - contribute to a much lesser extent and about equally to student training.

(b) The laboratory training received by Sandwich Course students is related to their college studies to a significantly greater extent than is that received by Day Release students.
This difference appears to be independant of the level of study of either group of students.

The Content of Training Programmes and the Facilities Employed for Training. The Purpose and Adequacy of Training Programmes

(a) Practical demonstration and instruction in essential practical details of procedures appear to be the predominant instructional approaches employed in laboratory training, though it is notable that, in an occupation which involves heavy responsibility, such instruction is apparently not invariably provided.

Significantly less emphasis seems to be placed upon instruction of the students in the theoretical principles underlying their work, its clinical significance and alternative techniques which might be employed.

This pattern of instructional approach does not appear to vary significantly in the different institutions and departments in which the students were trained. It also appears to be independant of the level of study and the type of course which the survey subjects followed.

(b) The large majority (85%) of the survey subjects received all or most of their training at the laboratory bench.

The use of senior technicians offices, or rooms set aside for instructional purposes was reported to be used by significant minorities of the survey subjects.

(c) The majority of the subjects (55%) thought their usefulness to their laboratory to be the primary aim of the training they received. Most of the remainder considered training to be equally concerned with their usefulness to the laboratory and with the interests of their careers.

(d) The subjects expressed limited satisfaction with all the features of training about which they were questioned.
They appeared to consider their instructors, the situation in which they received training, the amount of practical training received, and the attention given to understanding the clinical importance of their work relatively more satisfactory than the time allocated to, and the organisation of their training, and they expressed limited satisfaction with the attention given in their training to the underlying scientific principles of their work and their development of wide knowledge and skills.

(e) All but one of the listed features of training were considered satisfactory by significantly more Sandwich Course students than Day Release students, the greatest differences of opinion appearing to be in respect of the time allocated to training, its organisation, and the amount of attention given to their understanding of underlying scientific principles of their work. Opinions of Sandwich Course students and Day Release students with regard to the amount of practical experience they received did not differ significantly.

(f) The three features of training seen by the entire survey population as least satisfactory - the time allocated to training, its organisation, and the situations used for training purposes - were felt to be more satisfactory by significantly more students trained in the Teaching Group Hospitals than those trained in the District General Hospitals and this difference of opinion appears to be independant of the views of H.N.D. students who were trained exclusively in the Teaching Group Hospitals. Although a similar significant difference of opinion concerning the attention given to their understanding of underlying scientific principles, appears to occur between students trained in the Teaching Group Hospitals and those trained in the District General Hospitals, the findings suggest that this difference is due to views held by H.N.D. students in particular rather than to the institutions concerned.

Students Comments on Laboratory Training

The main impressions conveyed by students open comments tend to support some of the earlier findings in this chapter.

Although there was a notable degree of approval of much of the training that was provided, it was apparent that many students were dissatisfied with the essentially casual and irregular arrangement that seems to prevail.

Their comments suggest that laboratory training is considerably dependant upon factors which vary significantly form laboratory to laboratory. While it might be expected that arrangements made for training need to be reconciled with the service which the laboratory is required to provide, it appears that there is very considerable variation in the extent to which factors such as workload, staffing levels and the enthusiasm senior staff show towards training affect the quality and quantity of training which students receive.

Chapter 9. Objectives of the Combined Educational and Training Programmes

(a) With regard to the combined education and training programmes, students appear to consider those objectives which are immediately relevant to their day-to-day work as more important than objectives of a more fundamental and indirect nature.

(b) The "pursuit of qualifications of value in their careers" is seen by most students as less important to them than objectives of immediate relevance to their work, but is thought to be of greater importance than the more fundamental and indirect objectives of the combined educational and training programmes.

(c) The survey subjects appear to believe that objectives directly relevant to their day-to-day work and to the attainment of vocational qualifications are pursued more effectively than are the objectives of more fundamental value to them and their work.

(d) Although students tend to associate the objectives most directly related to their work with laboratory training and the more fundamental and indirect objectives with college studies, the findings suggest that students believe that the college and the training laboratory have a degree of joint responsibility for all the listed objectives.

(e) Although the actual pursuit of the various objectives in either college studies or in laboratory training appears to meet or exceed the expectation of the majority of survey subjects, the collective contributions to all the listed objectives by both the educational and training sectors seems to fall short of the students desires.

Chapter 10. Students' Final Comments

(a). 48 (23%) of the survey subjects responded to the final open question in the questionnaire.

(b). 20 (9%) of the students expressed concern over aspects of college study, most notably, the apparent irrelevance of college study and work and the need for more liaison between college lecturers and training supervisors.
The length of the day at college and the absence of private study time were referred to as serious disadvantages of Day Release courses and a preference for Block Release attendance was repeated by one or two respondants.

(c). 8 (4%) of the survey subjects commented upon laboratory training and all were concerned with various inconsistencies in the arrangements for training, especially those who were preparing for Fellowship Examination of the I.M.L.S. and who had entered the career after obtaining a university degree.

(d). 16 (8%) of the survey subjects commented upon the questionnaire itself. One or two were apparently concerned about the true anonymity of the questionnaire. Several suggested that certain questions were difficult to answer because the choice frameworks were unduly restrictive or because there was insufficient opportunity to answer in detail.
Several respondants expressed approval of, and interest in, the survey and welcomed the opportunity to participate.

(e). A few students referred to general issues, criticising the small amount of publicity which the career and associated courses were given, and also suggesting that the profession required more effective government.

Section 3. Conclusions and Recommendations

Throughout the investigation it has been necessary to adopt a degree of compromise in order to achieve a balance of breadth of study and depth of enquiry which permit a sufficiently descriptive portrayal of the present situation and at the same time provides explanatory evidence upon which recommendations for improvement may be based.

In consequence, study has been focused upon those areas believed to be most important to an understanding of the situation, and enquiry has been restricted to those aspects thought most likely to reveal opportunities for improvement.

In spite of such limitations, the investigation has yielded a very considerable mass of data relating to many aspects of a medical laboratory technicians' career, his vocational education and his in-service training.

Viewed retrospectively, the investigation exhibits a number of defects and shortcomings.

Although the questionnaire was pre-tested by piloting, the responses of the survey subjects indicated that one or two of the questions were not clearly understood. These difficulties appear to have been limited to questions upon issues seen in different contexts according to the type of college course which the survey subject was pursuing.

In order to maximise the amount of information obtained, certain of the questions required the completion of response matrices of considerable length and complexity. Although there are no positive indications that these were beyond the capacity of the survey subjects, the need for such complex responses may have to some extent limited the care and attention which the survey subjects gave to these responses.

The data obtained from the completed questionnaires provided opportunity for extensive explanatory analysis. Although it was intended that such analysis would be restricted to a limited number of relationships, it is recognised that certain of those which have not been explored may have warranted investigation. Perhaps the most notable omission in this respect was the failure to examine the relationship of responses to some of the open questions which were asked, with the responses to related closed questions or with the main explanatory variables. The survey revealed considerable variation in the degree of satisfaction which students found in aspects of college studies and in the quality of provision made for laboratory training. Although these findings provide an empirical measure of the quality of college study and of training, it might be said that a true measure of the effectiveness of these processes would require investigation of the actual attainment of students: this is however beyond the scope of this investigation. Notwithstanding these and perhaps other oversights and omissions, the findings set out in chapters 4 to 9, and summarised in section 2 of this chapter, do present an informative perspective of the present situation and also demonstrate certain patterns of practice and opinion. These are discussed below, together with a description of any developments which they suggest - either as recommendations for possible action or as proposals for further investigation.

The Characteristics of the Survey Population

The survey population would seem in most respects, adequately representative of medical laboratory technicians in training in England and Wales, especially so of those in Wales.

It is however regrettable that the population did not include a group of students attending a college course arranged on a Block Release basis. Although only nine colleges in England and Wales offer one or more courses in this mode of attendance, inclusion of such a group in the survey population may have provided an interesting body of opinion, particularly in respect of college study and upon the relationship of college study and training.

As the survey population was composed exclusively of subjects who were pursuing academic study and training essential to professional advancement, it is not surprising that all the subjects are relatively young, 85% of them being under 25 years of age.

The similarity of the sex distribution of the survey population to those demonstrated by Clarke J.W.(1968) and Allison R.T. (1974) suggests that the career continues to attract young men and women to a similar extent.

G.C.E. 'O' Level and to a lesser extent G.C.E. 'A' Level remains the commonest qualification used as a platform for entry to the career.

A small but not insignificant proportion of the survey subjects presented a university degree as an entry qualification.

Movement towards a predominance of graduate entry would probably be seen to be in the interests of the profession, although self-interest might cause some existing non-graduate medical laboratory technicians to view this with anxiety.

There is however little evidence to suggest that recruitment at the lower levels of academic qualification, followed by vocationally-orientated courses and laboratory training, will not continue to meet effectively the needs of the laboratory service generally.

If any notable shift towards graduate entry occurs, it will probably be as a consequence of much wider social and economic changes.

In the present climate of economic uncertainty, it would seem best to retain the flexibility which recruitment at all the existing levels of entry permits.

The small proportion (16%) of the survey subjects with experience of other employment is a finding which would probably be common to most careers with a well-defined structure of vocational education, training, and qualification. For the great majority of recruits, medical laboratory technology is a career which is entered directly after completion of full-time education and this is reflected by the age range of the survey population.

Entry to the Career

The considerable knowledge of, and positive and specific committment to medical laboratory technology, which most recruits appear to have had prior to entry to the career suggests a generally adequate and fairly effective level of career advice and guidance.

The great majority of the survey subjects sought advice, in most instances from more than one source and almost all the sources that were consulted were found to be predominantly helpful.

It is however rather disappointing to find that sources with an important formal commitment to provide advice - teachers, Youth Employment Officers, Career Conventions - were found to be unhelpful by 30% or more of the survey subjects who sought advice from these particular sources.

Exploration of the quality of the information upon medical laboratory technology which teachers and Youth Employment Officers possess and the manner in which advice on this career is provided at Career

Conventions would seem to be a profitable area for further investigation.
Perhaps understandably, for students who enter full-time employment in medical laboratories directly from full-time education, the availability of a job which is within easy reach of their homes seems to be the primary factor which governs their choice of employing institution. Against such a compelling factor, it is pleasing to find that a significant number of these students were able to exercise a degree of choice based on either an understanding that the institution was a good place to work or as a result of being impressed during a school visit to the institution. This last finding indicates that a substantial number of the survey subjects acquired prior knowledge of the job by what may be the best possible way - by seeing for themselves the day-th-day work which is carried out in medical laboratories. This approach seems very much to the credit of the students, if they arranged visits on their own initiative; of the teachers, if the visits were organised as school activities; of the employers, who made such visits possible.
It is certainly a mode of career guidance which should be encouraged.
For students who were pursuing Sandwich courses, the availability of a job could not, at the time of the survey, be a measurable factor in their choice framework. This may explain why a far higher proportion of these students (60%) rated an institution being "a good place to work" as their primary choice factor.
The eventual need to find a job on completion of their studies may later compel many of them to rearrange their priorities.

Findings concerned with the students' job expectations and their comparative evaluation of their working conditions, convey the general impression that the survey subjects were predominantly satisfied with their jobs.
This impression is strongest in relation to the more 'intellectual' aspects of their work - the interesting nature and variation of the work,

the intellectual stimulation which it provides, and the altruistic image which it holds. The notable level of job satisfaction recorded probably owes much to these features of the job.

The impression of general satisfaction is similarly strong in the responses relating to the 'professional' aspects of the career - the prestige, security and career opportunities which it provides, and also the social climate of the working situation.

It is present, though less pronounced, in the subjects responses relating to the physical conditions and facilities existing in the working situation and to the hours of work and holiday allocation.

Opinions and comparisons relating to salary tended to be marginally approving, and analysis of responses on this issue suggests that this position may be influenced by the survey subjects occupying the lower salary scales.

Responses referring to other features of the job were essentially neutral with the exception of a number of references to uncommon job characteristics which a few students appear to find offensive.

The open comments which the survey subjects made upon their conditions of work and their responses to the subsequent structured comparative questions show in their differences a degree of conformity, and in their similarities a level of consistency which supports the conclusion that medical laboratory technicians exhibit a notable level of job satisfaction, are well-motivated, and consider themselves relatively fortunate in their occupational circumstances.

Membership of the I.M.L.S.

It is not surprising that the frequency of student membership of the I.M.L.S. is low among newly-recruited technicians and that it increases progressively as they approach full qualification.

Initially, working as very junior members of the staff of laboratories, they will have little or no knowledge of the benefits of close association with a professional organisation and may not readily identify themselves as part of a professional group.

Eventually, when they approach Fellowship Examination of the I.M.L.S., they are compelled to obtain membership. Before that time, whether they seek membership appears to depend to a considerable extent upon the encouragement they are given in that direction. The frequency with which such encouragement is given, as students progress in the early years of their careers, parallels very closely the frequency of actual membership and the apparent effectiveness of the encouragement which they receive is remarkably constant (39 - 42%) for students in all courses except those in the Fellowship course - for whom it is in effect obligatory - and for students pursuing the H.N.D. course. Students in this last course show a significantly greater frequency of encouragement received and of actual membership.

The frequency with which students receive encouragement to join the I.M.L.S. and also the frequency with which they actually obtain membership is also dependant upon the institution within which they are employed. Those employed by the University Hospital of Wales were significantly more frequently encouraged to join the I.M.L.S. and were significantly more frequently members of the I.M.L.S. than were the students employed in all other institutions for which statistically reliable information was available.

These findings may be related to those which show that H.N.D. students are significantly more frequently encouraged to join the I.M.L.S. and actually hold I.M.L.S. membership with a significantly greater frequency than students in all courses other than the Fellowship course, for H.N.D. students are trained exclusively at the University Hospital of Wales.

The probability of a student joining the I.M.L.S. before he is compelled to in order to enter the Fellowship examination, appears to be largely dependant upon the encouragement which he or she is given. This in turn, seems to be significantly dependant upon the institution within which he or she is employed, and is independant of the department of that institution in which he or she works.

These findings suggest that effective responsibility for encouraging professional membership lies within the respective employing institutions and is more dependant upon broad institutional policies than upon departmental direction.

The survey subjects exhibited considerable variation in their knowledge of the functions and role of the I.M.L.S. and the probable benefits of membership. Some showed a quite astute awareness of these matters, others held various misguided notions and many were entirely uninformed. These findings suggest that even when students are given encouragement to join the I.M.L.S. it may often be casual and relatively superficial.

It seems likely, at least in the immediate future, that school-leavers with G.C.E. 'O' and 'A' Levels will continue to be recruited to the profession in substantial numbers. Early involvement with the professional organisation during the formative years of their careers would certainly be beneficial to the recruits themselves and to the profession but unless they are more actively encouraged to obtain early membership of the I.M.L.S., most will remain outside the professional body at least until membership becomes a necessity for entry to Fellowship Examination.

It is apparent that many of the survey subjects were largely ignorant of the benefits of I.M.L.S. membership and few were actively hostile, so it is likely that many more would consider early membership if they were properly informed of its advantages.

There seems to be a clear need for more careful and comprehensive guidance of recruits in this respect. It is an essentially local responsibility falling mainly upon the senior staff of medical laboratories and one to which the staff of colleges which provide courses for these recruits, could contribute.

College Studies

Viewed collectively, the survey findings which relate to college studies indicate that the students looked upon the courses which they were attending and the study facilities which they used with a general degree of general satisfaction. Responses in this area of the investigation did not point towards any gross defects or deficiencies in the major aspects or fundamental features of courses and facilities. They did however, draw attention to certain specific features, about which a significant number of students appear to be concerned or dissatisfied: these responses merit careful consideration, and together with certain notable divergencies of view, seen when responses are examined against selected explanatory variables, reveal a number of opportunities for possible improvement and also point to several aspects which would justify further investigation.

As might be expected, most of the survey subjects expressed a preference for the mode of attendance of the courses which they were actually pursuing and perhaps also predictably, a minority of students in most courses, stated a preference for a mode of attendance other than that of the course which they were pursuing. In this context, what was particularly signicicant was the high proportion of students in all courses who said they would prefer a Block Release mode of attendance. This trend of opinion was most marked in the more advanced courses and represented a majority view among students in the course leading to Fellowship of the I.M.L.S..
At the college from which the survey population was selected, no courses were operating in a Block Release mode during the survey period.
Although Block Release is an approved mode of attendance for all levels

of study leading to qualifications in Medical Laboratory Sciences, this mode of attendance is the least frequently employed. Colleges and employers generally appear to find a Day Release arrangement more practicable and Block Release seems only to be employed where Day Release is unworkable for geographical reasons.

Many of the students who expressed a preference for a Block Release mode of attendance did however support their views with cogent educational argument and although this attendance mode is said to be more costly to employers and operationally more difficult for colleges, the strength of student opinion on this matter suggests that it should not be dismissed without the most careful consideration.

Most students in all course types and attendance modes appear to have been quite adequately provided with information upon course arrangements and upon examination and qualification conditions and criteria. However, the findings do suggest that Sandwich course students are rather better served in some of these respects than are Day Release students.

Although the adequacy of students' knowledge and information upon examination and qualification conditions and criteria is not significantly dependant upon either level of study or mode of attendance, knowledge of course arrangements and the availability of course information appears to be adequate for significantly more students attending in a Sandwich mode than for those attending Day Release courses, and this difference is independant of the level of study. Furthermore, the findings show that Sandwich course students are provided with such information more readily than are Day Release students, and that course tutors are a significantly more common source of information for Sandwich course students, while subject lecturers are the most significant source of information for Day Release students.

In the college at which the survey was carried out, course tutors are appointed for each course and one of their main duties is to ensure that students are properly informed of course arrangements and the conditions and criteria for examinations and qualifications.

During the relatively long and continuous periods which Sandwich course students spend at college, there is ample opportunity for course tutors to meet and advise students, and regular periods may be set aside for this purpose.

The one day in each week which Day Release students spend at college is, on the other hand, entirely occupied with academic studies and there is little opportunity for course tutors to provide advice and guidance.

It is probably for this reason that Day Release students depend for information more upon lecturers with whom they are in regular contact.

If these circumstances are responsible for the difference between the provision and adequacy of information received by Sandwich course students and that received by Day Release students, it would appear that they affect the provision and adequacy of information upon examinations and qualifications less than they do information upon course arrangement arrangements. One explanation for this distinction may be that, with what little opportunity they have, course tutors to Day Release courses take care to ensure that students are informed of examination and qualification conditions and criteria, but leave students to acquire the less crucial course information as best they can.

All students are clearly most dependant upon college staff for information upon courses, examinations and qualifications and other possible sources of this information contribute little.

Sandwich course students are consistently better served in respect to information upon examinations and qualifications and appear to consult course tutors more readily. These differences are almost certainly a reflection upon the much longer time which these students spend at college. Whether this constitutes a material advantage to academic progress and attainment could only be determined by further investigation.

It is hardly surprising to find that a considerable proportion of the survey subjects believe that the time allocated to supportive science studies and to general studies is excessive, and that the time devoted to specialised subjects is insufficient. The interests of students pursuing vocationally orientated courses in Further Education are almost always focused most intensely upon subjects which are easily identifiable with their jobs and usually less so upon subsidiary subjects. While the relevance of the former is obvious, even to students with limited knowledge and experience of work, the value and importance of the latter is less apparent and usually only fully appreciated when the applied specialised subjects are studied in depth and after considerable experience of the job.

Probably for similar reasons, students attitudes to general studies are commonly of indifference and in some instances, of positive hostility. Studies which are concerned with their general education, and are not directly related to utilitarian knowledge and skills directly applicable to their work are often poorly valued.

Although the survey findings seem to confirm these observations, it is notable that supplementary sciences and general studies are believed to be allocated too much time, and specialist subjects are believed to be allocated too little time, by significantly more students attending Day Release courses than by those attending Sandwich courses.

This suggests that Sandwich course students view the three main study areas with more impartiality than do Day Release students. Whether it indicates that they actually have a clearer understanding of the value and importance of supportive sciences and general studies, or whether they lack prejudices which Day Release students acquire when they enter full-time employment is a matter which could only be resolved by further detailed research. While further investigation would also be required to determine whether these differences have a measurable influence upon attainment, it is to be expected that the tendancy to accept the prescribed balance of attention given to the respective study areas would result in the studies undertaken by Sandwich course students being rather more effective and beneficial than those pursued by Day Release students.

It is pleasing to find that a wide variety of teaching and learning activities are employed to quite a significant extent in all courses and that almost all the listed activities were considered helpful by the great majority of the survey subjects.
Within the limited time available for college study - particularly for students attending Day Release courses - the allocation of time to the various activities must probably be something of a compromise, and it is perhaps natural that some students should have felt that the time devoted to some activities was insufficient.
Findings relating to certain of the listed activities - Demonstration, Discussion, Visits to Laboratories, Visiting Lecturers - do however show a particularly high valuation in terms of helpfulness, coupled with a notably frequent belief that the time allocated to these particular activities is insufficient. This seems to indicate that these activities merit a more generous allocation of time, perhaps even at the expense of other activities.
Student opinion of Practical Projects was exceptional in that almost a quarter (24%) of the survey subjects considered them to be unhelpful and almost one third (32%) thought that too much time was allocated to Practical Projects.
This apparent rejection of Practical Projects by a substantial proportion of the survey population is surprising and disappointing. Projects are essentially student-centred activities in which experimental

study is pursued under supervision, but with very considerable freedom of choice and direction, and independant of other students.

It might be expected that students would find that learning arranged in this way to be particularly interesting, stimulating and profitable; that the survey findings suggest that this is not the case seems to indicate the need for some investigation of the conduct of Practical Projects.

Student responses to questions upon the importance and adequacy of provision of the curricular features of their courses show that the quality of the information which they receive is of paramount importance to them and this supports an earlier observation, that they consider specialised applied subjects to be of more importance than supportive sciences.

A previous conclusion, that students do not place a great deal of value upon Practical Projects, also appears to be confirmed by these findings.

One apparently paradoxical finding relating to curricular features, is that although almost all of the students place some importance upon receiving constructive criticism of their work, far fewer attributed Homework with much importance.

The Relating of Study Topics to their Work was a matter which many students rated as very important, but their responses show that they felt this to be more important and more satisfactorily achieved in the specialised applied subjects than in supportive sciences. This, and the responses to the open question which concluded the section of the questionnaire concerned with teaching and learning activities, add weight to the earlier conclusion that students tend to rate specialised applied subjects as more important, and fail to see the relevance of much of their supportive science studies.

Although it is understandable that students should have a natural prediliction for specialised applied subjects, the importance of the foundation which supportive sciences provides is hardly questionable. The doubts which students seem to have concerning the relevance of supportive sciences, and their criticism of the teaching procedures and methods which are employed, indicate that renewed attention should be directed towards the content and presentation of supportive sciences, and ways should be devised to integrate and co-ordinate the component subject areas more closely and clearly. It seems particularly important to avoid treating supportive sciences as a series of isolated topics, and to present these studies as a continuing theme in which the study of fundamental scientific principles is progressively developed to a to a stage where their relevance and application to the specialised subjects can be clearly recognised and understood.

Boundaries which may exist between supportive sciences and specialised applied subjects will be artificial ones, created by operational circumstances. The development of teaching strategies which penetrate such boundaries, enabling students to see and understand the integral nature of these two subject areas, and in particular, to appreciate relevance and importance of supportive sciences, could certainly be expected to improve the effectiveness of college studies.

Most students appear to consider facilities for study at college at least adequate.

Findings relating to Lecture Accomodation, Laboratory Accomodation, and Laboratory Facilities and Equipment indicate that the felt adequacy of these facilities is independant of level of study. It does however, differ according to the students' mode of college attendance - all three types of facility being judged "good" or "fair" by significantly more Sandwich students than Day Release students.

All student groups within the survey population had access to, and made use of exactly the same facilities for college studies: it may therefore be concluded that Sandwich students had more modest expectations of college study facilities than did Day Release students. This difference almost certainly reflects the contrasting experience of the two groups. Day Release students probably compared the facilities which they found at college with the elaborate facilities and equipment commonly found in hospital laboratories. Sandwich students, on the other hand, would have been more likely to have based their judgement of college facilities upon those which were available to them at school, with which they probably compared quite favourably.

The open question which concluded the section of the questionnaire concerned with study facilities provoked many responses which, in the light of the previous finding, are probably attributable more to Day Release students than to Sandwich students. Almost all these responses were however, constructively critical, referring most notably to simple defects in the design of lecture accommodation, to conflicting class timetables and to an inadequacy of apparatus.

These matters certainly seem to merit attention: some of them at least, could probably be rectified with little difficulty and with measurable improvement in the effectiveness of the studies which students undertake.

Unlike the findings relating to other study facilties, those concerned with Library Facilities were not significantly influenced by the students mode of college attendance. Although more than 80% of the survey subjects' considered these facilities to be 'good' or 'fair', the distribution does appear to be related to level of study, for significantly fewer students attending advanced courses held such views.

Students pursuing advanced courses would almost certainly be required to undertake more advanced reading than would students in the lower level courses, and they would also be more likely to need access to literature of a much more specialised nature. It is therefore to be expected that fewer students in advanced courses would find library facilities satisfactory and the finding that less than 20% of these students took this view suggests modest deficiency rather than gross inadequacy. Students indicated in their open comments that the most notable deficiencies in library facilities was the limited availability of up-to-date literature on the specialised applied subjects. This is a predictable criticism. Such literature tends to be very costly and the establishment of priorities of expenditure is a difficult process which requires a balance of attention to majority and minority needs.

The college facilities which, from the opinions of the students, would seem to be least satisfactory were those associated with refectory facilities and Student Union facilities. More than half of the survey population considered these to be 'poor' and the vigour of much of the comment on these matters suggest that they do merit serious attention.

Laboratory Training

Of all the findings which have emerged from this investigation, those concerned with laboratory training are probably the most remarkable and significant.

Unlike the findings relating to college studies, which revealed a considerable number of mainly specific and detailed anomalies and deficiencies in an essentially systematic structure, the findings which were associated with laboratory training portray a loose and almost entirely informal process which exhibits significant qualitative and quantitative variation.

The training appears to be mostly carried out by qualified technicial staff, largely irrespective of grade or position, and graduate staff - medical and non-medical - seem to play a very minor part in the training of technicians.

There is no evidence of specific members of staff having defined resposibilities for training. Most of the training which students received was reported to be carried out in the working situation at the laboratory bench and seems to have been predominantly utilitarian, with notable emphasis upon the essential practical details of procedures and with limited concern for wider knowledge and understanding. The apparent predominance of this instructional approach in all the institutions and departments in which the students are trained, and its independance of level of study and of course type, suggests that within the employing laboratories, training is viewed as a process which is subject to, and must meet, immediate operational needs. Responsibility for wider theoretical instruction appears to have been almost wholly abdicated to college courses.

These impressions are certainly supported by the weight of student opinion upon the purpose of their training, by their views of the adequacy of different aspects of their training and by their comments upon the training which they receive.

Within the overall portrait which emerges from the findings relating to laboratory training, the type of course which students pursue and to a lesser extent the type of institution within which they are employed and trained, appear to be particularly significant determinants.

Sandwich course students are shown to receive training which is greater in amount, is arranged on a more regular basis and is more closely related to college studies than is the training received by Day Release students. The various features of training appear also to satisfy consistently more Sandwich course students than Day Release students. Similar differences become apparent when responses are viewed against the type of institution in which students are trained and it seems clear that training provided by the teaching group hospitals is greater in amount, is arranged on a more regular basis and is more satisfactory to students in terms of its organisation and the situation in which it is undertaken, than that provided by other institutions.

Findings relating to the influence which course type and type of employing institution have upon the quality and quantity of training are complicated by the fact that a large proportion of the Sandwich course students in the survey sample - and all of those who were pursuing H.N.D. - were trained in the teaching hospital group.

Further analysis of results, which took this complication into account, shows that differences in the amount of time allocated to training and in the extent of students' satisfaction with the more theoretical aspects of training, are dependant more upon course type than upon the type of employing institution. Conversely, differences in the reported regularity of training and in students' apparent satisfaction with the time devoted to training, its organisation and the situation in which it was carried out, seem to depend more upon the type of institution in which they were trained - teaching hospital group or District General Hospitals - than upon the type of course which they followed.

To the extent to which student opinion may be taken to reliably reflect the true qualities of training, it may be concluded that of all the identifiable groups within the survey population, H.N.D. students, who were trained exclusively in the teaching hospital group received training which was best in terms of time allocation, regularity, content and arrangement.

Students who were employed in the teaching hospital group other than those who were pursuing the H.N.D. course, seem to have received training which was inferior in respect of content and time allocation but was similar in most other respects to that received by H.N.D. students.

Training in laboratories outside the teaching hospital group appears to be less satisfactory in most respects than that provided within the teaching hospital group.

A further distinction in respect of training was that, regardless of the type of institution in which students were trained and of their level of study, the training of Sandwich students was related to college studies to a significantly greater extent than was the training received by Day Release students.

The reasons why Sandwich course students receive training which is apparently better in several respects than that received by Day Release students are almost certain to be found in the ways in which the laboratory training of these two groups of students is generally conducted.

Sandwich courses are essentially college-based, and between periods of college study students are placed in hospital laboratories for the explicit purpose of training. During these periods of training, they occupy a supernumerary role although they do, for the purpose of gaining practical skills and experience, play an active part in the work of the laboratory.

A book issued to each student is used to prescribe and record training, and students' progress is reviewed and recorded at the end of each training period.

Unlike Sandwich course students, Day Release students are appointed to medical laboratories as full-time employees. They form an integral part of the staff of laboratories and contribute substantially to the day-to-day work.

Although guidance upon the content and management of laboratory training for Day Release students has been issed by the Medical laboratory Technicians Board of the Council for Professions Supplementary to Medicine and published in D.H.S.S. STM (74) 29, at the time the

survey was undertaken there was no evidence that well-defined arrangements for the control and direction of training, for the correlation of training with college studies, for the counselling of trainees or for the monitoring of their progress, were in operation in the laboratories within which the survey subjects were employed.
It seems probable that the status of the students during laboratory training, the periodicity of college study and laboratory training, and especially the stringency of arrangements for the control and the direction of training are important determinants of the quality and the quantity of training received and in these respects, training provided as part of a Sandwich course is more consistent with the recommendations of the Medical Laboratory Technicians Board and STM (74) 29 than is that provided for Day Release students.

To recommend upon the basis of these findings that Day Release courses, dependant as they are upon employment-centred laboratory training, should be replaced by college-based Sandwich courses would almost certainly be unwise and unwarranted.
Although the information and views obtained from students suggest that the training received by Sandwich course students is in several ways superior to that received by Day Release students, there is no evidence to indicate that the standard of training of Day Release students imposes a significant limitation upon the quality of service which medical laboratories provide: this would require and would seem to justify further investigation.
It must also be borne in mind that economic and organisational factors would make a complete transition to Sandwich-based training very difficult or even impossible to accomplish. Furthermore, it is clear that the employing institution may be as influential a determinant of the quality of training as is the course type.

The weight of evidence which the present survey provides does however seem to stongly support the continuation of existing Sandwich courses. What also seems indisputable is a need to improve the training undertaken in the different institutions to a uniform standard which is qualitatively and quantitatively comparable with that provided for Sandwich course students. The retention of Sandwich courses may provide a useful benchmark for the evaluation of such improvement.

It is clear that the recommendations made in STM (74) 29 have yet to be effectively implemented and that serious attention seems to be required in this direction.

When the recommended provisions and procedures have been fully established it would be profitable to re-examine the processes of laboratory training not only from the viewpoint of the students - as has been done in the present survey - but also from the perspective of the employing laboratory.

In this way it may be possible to determine with certainty the relative merits of combining properly organised and systematic laboratory training with Day Release and with Sandwich courses and thus ascertain the optimal mode of training for medical laboratory technicians.

Objectives of the Combined Educational and Training Programmes

In discussion of the survey findings relating to college studies it has already been noted that students tend to place highest priority upon subjects which have direct practical application and which can be most closely identified with their work. Similarly, the findings concerned with laboratory training suggest that although the instruction given them in the laboratory is usually casual and irregular and is often very limited, the practical instruction which they do receive lead them to view their training with considerable satisfaction.

Student opinion of the importance of the objectives of the combined education and training programmes confirm these impressions.

It is clear that they regard the acquisition of utilitarian knowledge and skills as the most important objectives of the combined programmes and relegate wider intellectual skills and theoretical knowledge to a distinctly secondary position.

In an occupation which is predominantly practical and which requires highly specialised manual skills, it is perhaps not surprising that such views prevail, particularly among the younger and less experienced practitioners who are likely to be most conscious of their newly-acquired practical expertise and to place less value upon theoretical learning which to them is a less demonstrable facility.

This may explain the intermediate rating which students tended to give to the importance of Qualifications of Value in the Career as an objective of the combined educational and training programmes, for they will have been aware that in order to attain vocational qualifications, they are required to demonstrate not only the knowledge and skills which are immediately relevant to their day-to-day work, but also those of a more fundamental nature.

Student opinion of the effectiveness with which the same specified objects of the combined educational and training programmes were pursued parallels quite closely their rating of the importance of these objectives but it is questionable whether this can be taken to be a true reflection of the quality of provision relating to the respective objectives. It may in fact simply demonstrate that the effectiveness of learning and instruction is substantially dependant upon the subjects' belief in the importance of the particular objective.

Several notable features which emerge from the findings illustrate the importance of careful co-ordination of college studies and laboratory training.

It is evident that many students associate the various objectives predominantly with either college study or with laboratory training, tending understandably to associate the more practical, work-orientated objectives with laboratory training and relating the more theoretical and fundamental knowledge and skills with college study.

However, a substantial proportion of the survey population - invariably more than 40% - appear to believe that college study and laboratory training should jointly contribute to the listed objectives, while a consistently smaller proportion report the actual pursuit of the objectives in both situations.

At the same time, the numbers of students who consider that the various objectives should be pursued exclusively in one situation or the other are almost invariably much smaller than the numbers of students who report actual pursuit of the objectives in this manner.

Although there is a tendancy for students to associate the objectives of the combined educational and training programmes exclusively with either college study or with laboratory training, many clearly believe that all the listed objectives should be pursued, perhaps to varying degrees, in both situations and that the extent to which this actually takes place falls considerably short of what is desirable.

These findings suggest that as well as examining in greater detail the nature and extent of what is and what should be accomplished in college study and in laboratory training, further investigation should be focused upon the exploration of methods of co-ordinating the activities in the two situations so that each may make the most appropriate contribution to an effectively integrated process of study and training.

Section 4. Final Summary

Viewed in the context of the Skilbeck model for curriculum development, the survey findings present a portrait of the situation which, although complex and far from complete, does suggest certain measures which might be expected to improve the effectiveness of the present arrangements for the education and training of medical laboratory technicians. The most important of these form the basis of the following recommendations:

Career Guidance

(a) Teachers and Youth Employment Officers should be more effectively equipped with comprehensive and up-to-date information on the career.

(b) There should be increased opportunity and encouragement for school-leavers to observe the work carried out in medical laboratories.

(c) Senior staff in medical laboratories should give more attention to providing recruits with information and guidance upon the professional aspects of the career.

(d) Within colleges, arrangements should be made to ensure that students, particularly those on Day Release courses, are more fully informed of the arrangements and requirements for courses, examinations and qualifications.

College Studies

(a) More opportunity should be provided for study by Block Release as an alternative to Day Release and Sandwich courses.

(b) The General Studies components of courses need to be reconsidered in relation to the vocational components of courses and to the needs of the students.

(c) Ways should be sought to present syllabus material so that the interrelationships of topics and subject areas are more clearly demonstrated. In particular, the supportive nature and relevance of basic sciences should be emphasised.

(d) Within study programmes there should be increased use of discussion periods, visits to specialised establishments and lectures by visiting specialists. The aims, objectives and mode of operation of project work requires re-examination.

(e) Certain improvements in the accomodation and facilities provided for lectures and laboratory work are desirable.

(f) There is a need for improved library provision in respect of advanced studies in the more specialised subjects. Day Release courses should be programmed so that students have greater opportunity to use the college library.

(g) Facilities provided by the Students Union and the Refectory need to be improved and extended.

Laboratory Training

(a) More time needs to be specifically set aside for training within laboratories.

(b) The training carried out in laboratories should be arranged in a more planned and systematic manner with supervision and monitoring as prescribed in STM (74) 29.

(c) Laboratory training should include instruction in the wider aspects of the occupation and should exploit and relate to the theoretical knowledge which students acquire through college courses.

(d) There is a need for improvement in the methods of instruction which are employed and in the accomodation and facilities which are available for laboratory training.

The Combined Education and Training Programmes

(a) Liaison between employing laboratories and colleges should be refined so that the processes of education and training are more fully co-ordinated and complementary.

(b) Further investigation, by survey of college lecturers and laboratory instructors, should be instigated.
This would provide a view which would not be restricted to the student perspective and which would therefore permit a more detailed understanding of the true status of education and training, a fuller appreciation of any defects which are present and identification of any further opportunities for improvement.

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Appendix A

Consultative Letter to Employers

Llandaff College of Technology, Western Avenue, Cardiff CF5 2YB
Principal J Cotterell, CEng, FIEE, AIMechE, MIProdE, MIERE, MAMEME

department of biological and chemical sciences
Head of Department A J Juniper, BSc, PhD, MSc, FLS, FRES, MIBiol

☎ Cardiff 561241 Ext.

Our Ref JC/1 Your Ref

16th. October 1975

Dear ,

I have recently embarked upon a programme of research in connection with a higher degree of The Open University.

The subject of my research is the relationship between the education and the training of medical laboratory technicians and I propose to collect data by means of a questionnaire to be completed by technicians attending courses at this college. In addition, I hope to collect information from college lecturers and from the senior staff of medical laboratories who are concerned with the training of technicians.

As a proportion of the students I hope to survey are employed in your department, I feel it is right and proper to seek your approval in this matter. I should make it clear that all the data required for the study would be collected on an entirely voluntary basis and total anonymity in respect of individuals and of establishments would be rigidly preserved.

I realise that you may well wish to have more details of my proposals and I should be very glad to provide these if you are able to spare me a little of your time. Any constructive suggestions or advice which you might feel inclined to give me on this matter would, of course be most welcome.

Yours sincerely,

John Clarke
Principal Lecturer in Medical
Laboratory Sciences

Appendix B

Sample of Completed and Coded Questionnaire

An Investigation of College Studies and
Laboratory Training of Medical Laboratory Technicians

Dear Student,

The attached questionnaire has been designed to investigate some features of college studies and laboratory training provided for medical laboratory technicians, and to study the relationship of these two qualifying processes.

In addition to questions of a factual nature concerning your educational record, employment, college studies and laboratory training, the questionnaire contains a number of questions which seek your personal opinion on these matters.

The investigation has the approval of the D.H.S.S. at the Welsh Office, of the College and of the hospital authorities employing the students whose help is being sought in this way.

It is hoped that with your co-operation we may obtain information which will contribute to future beneficial adjustments of college study and laboratory training arrangements. It is also my hope that the questionnaire may form part of a research programme which I am pursuing for the award of a Higher Degree of the Open University.

I should be most grateful therefore, if you would complete the questionnaire, with the assurance that the information obtained will be treated with the strictest confidence. No individual, department or institution will be identified in any report, to the D.H.S.S. or to the hospital authorities. Your name is required for clerical checking purposes only.

Your participation is, of course, an entirely voluntary matter and if you wish to be excluded from the study you may return the blank questionnaire. Your help and co-operation in this investigation would however be very much appreciated.

Yours sincerely,

John Clarke
Principal Lecturer in Medical
Laboratory Sciences
Llandaff College of Technology.

PLEASE INDICATE YOUR ANSWERS BY TICKING UNLESS OTHERWISE REQUESTED.

<u>STUDENTS ATTENDING O.N.D. OR H.N.D. COURSES</u> - IN ANSWERING QUESTIONS ON 'WORK' AND 'TRAINING' PLEASE CONSIDER THE HOSPITAL LABORATORIES IN WHICH YOU ARE TRAINED AS YOUR 'PLACE OF WORK'.

Section I
Biographical Data and Career Profile

Office Use

Biographical Data

1. Please write in your full name:

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2. Please indicate your sex:

Male	✓
Female	

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3. Please indicate your age: 19 years

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19

4. Please indicate your marital status:

Married	
Single	✓

8
2

Educational Record

5. Please indicate the number of subject passes which you hold in any of the following examinations:

C.S.E. Grade I	3
G.C.E. 'O' Level	5
G.C.E. 'A' Level	0

9
350

6. Please indicate and/or insert any of the following qualifications which you have already obtained:

	Qualification (Tick)	Elective Subject (M.L.S., App.Biol. etc.)	Option Subject (Haem. Hist. etc.)	Office Use
General Course in Science	☐			
O.N.C.	☑	MLS		
O.N.D.	☐			
H.N.C.	☑	MLS	HAEM.	12 2
H.N.D.	☐			
Final I.M.L.S.	☐			13 1
Other Qualif. (Please specify	☐			

Office U

Present Employment

7. Please indicate in the chart below the institution and department in which you NOW work (or LAST worked in the case of O.N.D. and H.N.D. students):

Dept. / Instit.	Bact.	Haem.	Hist.	Biochem.	Bl.Trans.	Other (Specify)
C.R.I.						
U.H.W.						
East Glam.			✓			
St.Tydfil's						
Nevill Hall						
Royal Gwent						
St.David's						
Llandough						
Sully						
Bridgend						
Caerphilly						
B.T.S.						
Other (Specify)						

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Previous Employment

8. Have you previously worked for eight weeks or more in a department or institution other than the ones you have indicated in your last answer?

Yes	
No	✓

16

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Office Use

9. If your answer to the last question was 'Yes', please indicate in the chart below any institutions and/or departments in which you have previously worked (or worked previous to your present or last training period, if you are an O.N.D. or H.N.D. student):

Dept. / Instit.	Bact.	Haem.	Hist.	Biochem.	Bl.Trans.	Other (Specify)
C.R.I.						
U.H.W.						
East Glam.	✓	✓			✓	
St.Tydfil's						
Nevill Hall						
Royal Gwent						
St.David's						
Llandough						
Sully						
Bridgend						
Caerphilly						
B.T.S.						
Other (Specify)						

17 3 3 3

20 1 2 5

10. If you have been in full time employment for six months or more in any occupation other than medical laboratory technology please state the nature of the occupation:

Laboratory Technician in Steel Works.

23 3

11: Listed below are some agencies which when you left school might have provided you with helpful advice and guidance on medical laboratory technology as a career.

Please indicate the extent to which you found them helpful or otherwise:

Agency	Very Helpful	Helpful	Fairly Helpful	Unhelpful	Very Unhelpful	Help not sought or offered
Parents or relatives		✓				
Teachers			✓			
Youth Empl.Officer			✓			
Friends				✓		
Employers						✓
Books or Newspapers						✓
Colleges		✓				
Career Conventions	✓					
Other (Specify) ______ ______						

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12. When you started work or training as a medical laboratory technician did you find the job:

Exactly as you had expected it to be	
Mostly as you had expected it to be	✓
Somewhat as you had expected it to be	
Hardly as you had expected it to be	
Not at all as you had expected it to be	

33
2

Office Use

13. If you are now in full time employment, what was the most important factor which influenced your selection of a particular institution for your first job ?

You had heard it was a good place to work	
You had been impressed on a school visit there	
It was within easy reach of your home	✓
It was the only suitable job available at the time	
Other reasons (Specify):	

34 3

14. If you are currently pursuing an H.N.D. course or an C.N.D. course, what is the most important factor which will influence your choice of institution for your first job?

You think it will be a good place to work	
It will be within easy reach of your home	
You think promotion prospects will be good	
Other reasons(Specify)	

35 ☐

15. Please state in the space provided below, what you consider to be:

(a) The features which particularly make your present job an attractive one:

It is interesting work with plenty of variety and you meet patients and realise how your work helps them.

36 1

(b) The least attractive features of your present job:

There aren't any really unattractive feature as far as I am concerned.

37 2

Office

16. How do you think Medical Laboratory Technology compares with the jobs of your friends in other occupations who are about your age and with equivalent qualifications, in the following respects:

Medical Laboratory Technology is:	Very much better	A good deal better	Slightly better	About the same	Slightly worse	A good deal worse	Very much worse
Social prestige		✓					
Security				✓			
Intellectual stimulation		✓					
Social stimulation and activities			✓				
Physical conditions of the work						✓	
Pressure of work					✓		
Amount of work and working hours				✓			
Present salary			✓				
Salary scale as a whole		✓					
Position as a whole (including salary)		✓					
Position as a whole (excluding salary)			✓				
Opportinities to improve qualifications	✓						

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Office Use

17. How do you think your working situation compares with that of medical laboratory technicians you know working in other institutions , in the following respects:

My working situation is:	Very much better	A good deal better	Slightly better	About the same	Slightly worse	A good deal worse	Very much worse
Intellectual stimulation				✓			
Social stimulation and activities			✓				
Discipline in the laboratory					✓		
Supervision and guidance					✓		
Pressure of work						✓	
Amount of work and working hours					✓		
Physical conditions of work					✓		
Laboratory facilities and equipment						✓	
Interest and variety of work				✓			
Worthwhileness of the work you do				✓			
Appreciation of your work by other hospital staff					✓		
General job satisfaction					✓		

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Office

Associations

18. Please indicate the number of years you have been a member of the Institute of Medical Laboratory Sciences. If you are not a member please insert a zero in the space provided:

3 years

62
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19. Whether you are a member of the I.M.L.S. or not, have you been

Encouraged to join	
Discouraged from joining	
Not approached on the matter	✓

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20. Whether you are a member of the I.M.L.S. or not, please specify in the spaces provided below, any features which makes membership of the I.M.L.S.

64
D

Attractive to you:

Information on jobs and being able to participate in local meetings and discussions

Unattractive to you:

Subscription costs.

Office Use

Section II
College Studies

Attendance

21. Please indicate the college course and the year of the course that you are currently attending:

65 6

Course	Year		
	I	II	III
C.N.C.			☒
O.N.D.			☒
H.N.C.		✓	☒
H.N.D.			
S.F.I.M.L.S.			☒

22. Which do you consider to be the preferable form of attendance for the course you are currently pursuing?

66 1

Day release (one day and evening each week)	✓
Block release (periods of 1 - 6 weeks in college)	
Sandwich course (periods of 2 - 12 months in college)	

23. Please write below your reasons for the preferences you have indicated:

67 2

It adds variety to a weeks' work and allows one to assimilate knowledge slowly and to relate it to the practical experience gained at work.

Offioe Us

Course Information

24. In respect of details concerning course arrangements and requirements and examination and qualification conditions and criteria,

		Course arrangements and requirements	Examination and qualification conditions and criteria
Do you feel that your present knowledge of these is:	Very adequate		
	Fairly adequate	✓	
	Rather inadequate		✓
	Very inadequate		
Do you feel that information concerning these is:	Readily obtainable	✓	
	Fairly easy to obtain		
	Rather difficult to obtain		✓
	Very difficult to obtain		
If you need such information, which one of these sources would you be most likely to consult:	Head of College Dept.		
	Your Course Tutor	✓	
	Subject lecturers		✓
	Official Publications		
	Other students		
	People at work		
If you seek information of this sort do you usually find:	Ample immediate help		✓
	Rather limited help		
	You are directed elsewhere	✓	
	Little interest or concern		

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Office Use

25. Please insert below any comments you have on:

Course Arrangements and Requirements

A lot of time I spend in college seems to be wasted eg. <u>Liberal Studies</u> - it would be much better if we could have people from the hospital to outline the different aspects of the medical professi so that we can get an understandin of the part we play in the N.H.S.

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Examination and Qualification Requirements

In some subjects the lectures have just come from University and we seem to be studying far above the normal standard. This could be a good thing but it means that the pressure is greater.

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Office Use

Curriculum and Course Development

26. Your course is made up of some or all of the three main subject areas listed below. Please indicate your opinion of the amount of time alloted to each of the subject areas in your course:

Time Alloted to:	Too much	About right	Too Little
Basic Sciences		✓	
Specialist Subjects			✓
General Studies	✓		

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27. Listed below are some of the teaching and learning activites that you might encounter in your college course. Please indicate in the appropriate column:

(a) Those activities which you have already encountered at college.

(b) Your opinion of the helpfulness of these to your studies.

(c) Your opinion of the time devoted to these activites during your studies.

Teaching or Learning Activity	Encountered at College	Helpfulness			Time Allocation		
		Very Helpful	Fairly Helpful	Not Helpful	Too Much	About Right	Not Enough
Lectures		✓				✓	
Demonstration				✓		✓	
Homework			✓		✓		
Practical Exercises			✓				✓
Practical Projects		✓				✓	
Seminars	✓						
Discussion		✓					✓
Specialist Visiting Lecturers	✓						
Visits to Specialist Labbratories	✓						

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8. Listed below are some features which may influence the effectiveness of the learning process in your present course. Please indicate for the two mainsubject areas:

(a) How important you consider these features to be to your studies.

(b) How satisfactory is the provision of the features in your course.

	Basic Sciences						Specialist Subjects						Office Use
	Importance			Provision			Importance			Provision			
Is the:-	Very imp.	Fairly imp;	Not imp.	Very satis.	Fairly satis.	Not satis.	Very Imp.	Fairly imp.	Not imp.	Very satis.	Fairly satis.	Not satis.	
Up to date quality of information provided		✓			✓		✓					✓	23 2 2 1 3
Breadth of information provided		✓			✓			✓			✓		27 2 2 2 2
Depth of information provided			✓		✓			✓			✓		31 3 2 2 2
Visual illustration employed		✓				✓		✓			✓		35 2 3 2 2
Relating of topics to your work	✓					✓	✓					✓	39 1 3 1 3
Duration of your lectures	✓				✓			✓			✓		43 1 2 2 2
Provision of time for questions		✓			✓			✓		✓			47 2 2 2 1
Duration of practical sessions			✓	✓				✓		✓			51 3 1 2 1
Choice of practical exercises	✓					✓	✓					✓	55 1 3 1 3
Supervision during practical work	✓				✓				✓		✓		59 1 2 3 2
Constructive criticism of work completed		✓			✓			✓			✓		63 2 2 2 2
Setting of regular homework			✓		✓				✓		✓		67 3 2 3 2
Individual practical projects		✓			✓			✓			✓		71 2 2 2 2

Office Use

29. Please insert below any comments you have on the learning or teaching activites which are employed, or you feel should be employed, in your college studies:

Little use is made of T.V., radio, recordings or films in the college. Demonstrations and guest lectures at this level are non-existent and really unnecessary.

75

A

30. Listed below are some facilities relevant to college courses. Please indicate how you have found these to be during your college studies.

Facility	V.Good	Good	Fair	Poor	Bad
Lecture accommodation			✓		
Laboratory accommodation		✓			
Laboratory facilities and equipment			✓		
Library facilities				✓	
Student Union facilities					✓

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31. Please insert below any comments you have concerning the facilities provided for your college studies.

Canteen facilities for students are overcrowded and the food is expensive and not of a good standard, hence many students go outside during breaks. Student Union facilities at the college are little short of ridiculous.

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Office Use

Section III
Laboratory Training

Arrangements and Content

32. In an average week, how much time is specifically set aside for training in your place of work (or in your last training laboratory in the case of O.N.D. and H.N.D. students)?

None	
Less than one hour	✓
One to three hours	
More than three hours	

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33. If you recieve some training, is it on an arranged and regular basis or is it on a spontaneous irregular basis or a mixture of both?

Arranged and regular	
Spontaneous and irregular	
A mixture of both	✓

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34. Please indicate below the approximate amount of regular and/or irregular training given you by the staff of the laboratory as listed below:

	Arranged Regular Training				Spontaneous Irregular Training				
	Nil	A little	A fair amount	Quite a lot	Nil	A little	A fair amount	Quite a lot	All
Technical staff in charge of sections			✓					✓	
Qualified technical staff throughout the department		✓						✓	
Senior technical staff		✓				✓			
Non-Medical,degree qualified staff (ie.Biochemists)	✓					✓			
Medically qualified staff	✓					✓			

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1 2

Office Us

35. When you recieve laboratory training, to what extent do your instructors relate it, where appropriate, to what you learn at college ?

Completely	
A good deal	
A fair amount	
A little	✓
Not at all	

18
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36. When you are trained to carry out a particular laboratory procedure, are you given:

	Always	Sometimes	Never
Practical demonstration	✓		
Instruction in the essential practical details	✓		
Instruction in the underlying theoretical principles involved		✓	
Explanation of the clinical significance and value of the procedure		✓	
Information on alternative methods or techniques that could be used			✓

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37. Where do you recieve the training you are given ?

	All	Most	Some	Little	None
'At the bench' in the working laboratory		✓			
In the office of the senior or chief technician					✓
In a room set aside for teaching and instructional purposes					✓
In a workroom or laboratory set aside for practical training				✓	
In other places(Specify) ______________					✓

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Office Use

38. Do you feel that the training which you are given is specifically concerned with:

Making you an increasingly useful member of the laboratory staff	
Developing your knowledge and experience in the interests of your career	
About equally concerned with both the above purposes	✓

29

3

39. Do you feel that the training which you are given in your laboratory:

	Yes	No
Is alloted about the right amount of time		✓
Is organised in a fairly satisfactory way		✓
Is given by the right persons	✓	
Is carried out in the right situation	✓	
Provides you with the right amount of practical experience	✓	
Pays the right amount of attention to your understanding of underlying scientific principles		✓
Pays the right amount of attention to your understanding of the clinical importance of your work	✓	
Pays the right amount of attention to giving you sufficiently wide knowledge and skill	✓	

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40. Please write in the space below any additional comments you wish to add to your answers concerning laboratory training:

Pressure of work makes it difficult to set aside long periods specifically for training
Depends on the department and the Chief Technician concerned.

38

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Office Use

41. Listed below are some possible objectives of the combined educational and training processes to which you are currently committed. Please indicate in the appropriate column:

(a) How important you consider each objective to be

(b) Where you think each of these objectives should be pursued

Possible Objectives	How important is it?			Where should it be pursued?			
	Very imp.	Fairly imp.	Not imp.	In training	In college	In both	In neither
Knowledge and understanding of basic science relevent to your work			✓		✓		
Ability to apply scientific principles to problems you meet in your work			✓			✓	
Knowledge and understanding of the procedures you use in your work	✓					✓	
Understanding of the medical significance of the work you do		✓				✓	
Development of your practical skills	✓			✓			
Ability to use your own judgement and initiative in your work		✓				✓	
Knowledge of new developments in biomedical sciences			✓		✓		
Qualifications of value to your career	✓				✓		
Development of your general education			✓				✓
Your continued social development			✓				✓

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Office Use

42. Considering the same possible objectives as listed in the previous question, please indicate:

(a) Where each objective is pursued at present

(b) How effectively each objective is pursued at present

Possible Objectives	Where pursued at present?				How effective at present?			Office Use
	In training	In college	In both	In neither	Very effective	Fairly effective	Not effective	
Knowledge and understanding of basic science relevant to your work		✓				✓		59 2 2
Ability to apply scientific principles to problems you meet in your work		✓				✓		61 2 2
Knowledge and understanding of the procedures you use in your work	✓					✓		63 1 2
Understanding of the medical significance of the work you do			✓		✓			65 3 1
Development of your practical skills	✓				✓			67 1 1
Ability to use your own judgement and initiative in your work				✓			✓	69 4 3
Knowledge of new developments in biomedical sciences		✓				✓		71 2 2
Qualifications of value to your career			✓			✓		73 3 2
Development of your general education		✓					✓	75 2 3
Your continued social development				✓			✓	77 4 3

Office Use

79

4

43. If you wish to add any comment on any aspect of, or item in this questionnaire, please do so below:

It seems. quite unnecessary. Why not give it to our employers, they would (and you) benefit from it quite a lot. A greater liaison should be made between the two.

Thank you for the time and trouble you have taken
to complete this questionnaire.

It is very much appreciated.

Appendix C

Piloting Interview Schedule with Summary of Responses

Piloting Study Interview

Subject's Name:

Date:

Course:

Interviewer:

Year of Course:

Completion Time:

Response to Letter of Introduction

		No.Responses				
		1	2	3	4	5
1. Presentation	(a) Was it easily readable?	4	1	0	0	0
	(b) Was it easily understandable?	5	0	0	0	0
2. Attitude to Stated Purpose						
	(a) As personal research	3	1	1	0	0
	(b) Value to study or training	5	0	0	0	0
3. Importance of anonymity						
	(a) Attitude to specifying name for given reason	5	0	0	0	0
	(b) Attitude to specifying employing institution and department	5	0	0	0	0
4. Attitude to Formal Approval		5	0	0	0	0
5. Attitude to Voluntary Assurance		5	0	0	0	0

6. Other Comments	O.K.	1
	Instructions insufficiently bold	1

Key. Scale: 1 - 5. 1 = Very satisfied, in favour, confident.

5 = Dissatisfied, not in favour or no confidence.

Responses to the presentation of each question in the Questionnaire

	Adverse Responses
1. Did you find any difficulty in reading the question?	0
2. Did you find any difficulty in understanding the question?	7
3. Did you think it was a reasonable question?	4
4. Did you find any difficulty in understanding how to indicate your answer?	2
5. Was there a place or space for you to insert the answer you wished to give?	6
6. Was there sufficient space for your answer?	7
7. Would you have liked to give more information on this question, had there been opportunity?	2
8. Did you not, or would you have preferred not to have answered this question because:	
(a) it was concerned with matters of a personal or private nature?	0
(b) it was concerned with matters of a confidential nature relating to your education, training or work?	0
(c) of any other reasons?	0

Responses to the questions: (a) Considering the Questionnaire as a whole, how do you view it with regard to the following"?

	No. of Responses		No. of Responses
Completion Time		Difficulty	
Very Short	0	Very Difficult	0
Short	0	Difficult	0
Reasonable	2	Reasonable	4
Long	2	Easy	1
Very Long	1	Very Easy	0
Interest in Subject		Interest in Results	
Very Interesting	0	Very Interested	0
Interesting	5	Interested	5
Not Interesting	0	Not Interested	0
Concern for Anonymity		Degree of Imposition	
Serious Concern	0	Serious	0
Some Concern	2	Mild	0
No Concern	3	Negligable	5
Felt Value of the Investigation			
Considerable	0		
Some	4		
A Little	1		
None	0		

(b) Are there any other topics concerning education or laboratory training that you would have liked to have seen explored by the Questionnaire? 1

Nature of Topic – College/Hospital Liaison

Appendix D

Question Coding Frames

Coding Frames

(For multiple-response, closed questions and for open questions)

Question 6. Col. 12.

G. Course in Science - 1

O.N.C. in M.L.S.	- 2	O.N.D. in M.L.S.	- 6
" App.Biol.	- 3	" App.Biol.	- 7
" Chem.	- 4	" Chem.	- 8
" Other	- 5	" Other	- 9

Col. 13.

H.N.C. in M.L.S.		H.N.D. in M.L.S.	
Haematol/Serol.	- 1	Haematol/Serol.	- A
Histopathology	- 2	Histopathology	- B
Clinical Chemistry	- 3	Clinical Chemistry	- C
Medical Microbiol.	- 4	Medical Microbiol.	- D
H.N.C. in Applied Biol.		H.N.D. in Applied Biol.	
Microbiology	- 5	Microbiology	- E
Biochemistry	- 6	Biochemistry	- F
Physiology	- 7	Physiology	- G
Other Options	- 8	Other Options	- H

Other Qualifications

C.G.L.I. Science Laboratory Technicians Cert. - J

University Degree - K

Other - L

Question 9. Cols. 17/18/19 Previous employing institutions(up to three). Institutions coded as in Question 7.

Cols. 20/21/22 Previous employing departments (up to three). Departments coded as in Question 7.

Question 10. Col. 24

Health Service (patient care) - 1

Health Service (non-patient care) - 2

Non-Health Service (laboratory) - 3

Non-Health Service (non-laboratory) - 4

Question 15. Cols. 36/37

Quotable responses - 1

Non-quotable responses - 2

Question 20. Col. 64

Attractions		Disattractions	
Job information	- 1	Cost	- A
Scientific information	- 2	"Closed shop"	- B
Benefits	- 3	Other	- C
Local Activities	- 4	Multiple resp.	- D
Qualifications	- 5		
Representation	- 6		
Other	- 7		

Question 23. Col. 67

Content - 1

Learning effectiveness - 2

Continuity - 3

Pace - 4

Correlation (Ed. to Tr.) - 5

Availability (Geog.) - 6

Domestic - 7

Financial - 8

Social - 9

Other - A

Question 25. Cols. 76/77 (Coded for retrieval purposes only)

Col. 76

Course Arrangements - 1

Course Requirements - 2

Course Arrangements and Requirements - 3

Other - 4

Col. 77

Examinations - 1

Qualifications - 2

Examinations and Qualifications - 3

Other - 4

Question 29. Col. 75 (Coded as activities listed in Question 27.)

Lectures - 1

Demonstration - 2

Homework - 3

Practical Exercises - 4

Practical Projects - 5

Seminars - 6

Discussion - 7

Visiting Lecturers - 8

Visits to Laboratories - 9

Other - A

Multiple responses - B

Question 31. Col. 5 (Coded as facilities listed in Question 3.)

Lecture accomodation - 1

Laboratory accomodation - 2

Laboratory facilities and equipment - 3

Library facilities - 4

Student Union facilities - 5

Other - 6

Multiple responses - 7

Question 40. Col 38 (Coded to correlate with Question 39.)

Time - 1

Organisation - 2

Persons - 3

Place - 4

Practical content - 5

Scientific content - 6

Clinical content - 7

Extent - 8

Other - 9

Question 43. Col. 79 (Coded for sub-sections of the Questionnaire and general comments categories.)

Biography and Career - 1
College Studies - 2
Laboratory Training - 3

Comments on Purpose - 4
Comments on Completion - 5
Comments on Use of Data - 6

Other Comments - 7

Appendix E

Statistical Analysis - Worked Examples

Influence of the type of course which the students' attended and of their qualifications on entry to the career upon the extent to which their experience of work corresponded with their expectations of it.

1. Influence of Type of Course.

Obtained frequencies (f_o)	Total	Exactly or mostly as expected	Somewhat as expected	Not as expected
Day Release students	155	96	49	10
Sandwich Course students	58	41	15	2
Total	213	137	64	12

Expected Frequencies (f_e)				
Day Release students	155	100	47	9
Sandwich Course students	58	37	17	3
Total	213	137	64	12

$(f_o - f_e)$				
Day Release students	155	-4	+2	+1
Sandwich Course students	58	+4	-2	-1
Total	213	0	0	0

$$ {}^2 = \frac{S(f_o - f_e)^2}{f_e} $$

$$ \text{So:}\ \chi^2 = \frac{(-4)^2}{100} + \frac{(+4)^2}{37} + \frac{(+2)^2}{47} + \frac{(-2)^2}{17} + \frac{(+1)^2}{9} + \frac{(-1)^2}{3} $$

But applying the Yates correction for continuity, this becomes:

$$ \chi^2 = \frac{(-3.5)^2}{100} + \frac{(+3.5)^2}{37} + \frac{(+1.5)^2}{47} + \frac{(-1.5)^2}{17} + \frac{(+0.5)^2}{9} + \frac{(-0.5)^2}{3} $$

So: $\chi^2 = 0.74$

Reference to distribution tables for chi-squared values shows the above value for χ^2 (with two degrees of freedom) to have no significance at the 5% level.

The extent to which the students experience of work corresponds to their expectations of it is therefore not significantly related to the type of course which they pursued.

2. Influence of the qualifications held on entry to the career.

Obtained frequencies (f_o)	Total	Exactly or mostly as expected	Somewhat as expected	Not as expected
'O' Level/C.S.E.	119	72	39	8
'A' Level	79	56	20	3
Degree	9	7	2	0
Total	207	135	61	11

Expected frequencies (f_e)				
'O' Level/C.S.E.	119	77.7	35.0	6.3.
'A' Level	79.0	51.5	23.3	4.2
Degree	9.0	5.8	2.7	0.5
Total	207.0	135.0	61.0	11.0

$(f_o - f_e)$				
'O' Level/C.S.E.	0	-5.7	+4.0	+1.7
'A' Level	0	+4.5	-3.3	-1.2
Degree	0	+1.2	-0.7	-0.5
Total	0	0	0	0

$$\chi^2 = \frac{S(f_o - f_e)^2}{f_e}$$

So: $$\chi^2 = \frac{(-5.7)^2}{77.7} + \frac{(+4.5)^2}{51.5} + \frac{(+1.2)^2}{5.8} + \frac{(+4.0)^2}{35.0} + \frac{(-3.3)^2}{23.3} + \frac{(-0.7)^2}{2.7} + \frac{(+1.7)^2}{6.3} + \frac{(-1.2)^2}{4.2} + \frac{(-0.5)^2}{0.5}$$

But applying Yates correction for continuity, this becomes:

$$\chi^2 = \frac{(-5.2)^2}{77.7} + \frac{(+4.0)^2}{51.5} + \frac{(+0.7)^2}{5.8} + \frac{(+3.5)^2}{35.5} + \frac{(-2.8)^2}{23.3} + \frac{(-0.2)^2}{2.7} + \frac{(+1.2)^2}{6.3} + \frac{(-0.7)^2}{4.2} + \frac{(0.0)^2}{0.5}$$

So: $\chi^2 = 1.79$

Reference to distribution tables for chi-squared values shows the above value for χ^2 (with four degrees of freedom) to have no significance at the 5% level.

The extent to which the students' experience of work corresponds to their expectations of it is therefore not significantly related to the qualifications which they held on entry to the career.