AN APPRAISAL OF THE MEDICAL TECHNOLOGY CURRICULUM OF THE COLLEGE OF ST. SCHOLASTICA

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Problems in
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A Requirement for the Degree
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by

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CHAPTER I

THE PROBLEM AND NEED FOR ITS SOLUTION

In the evolution of medical laboratory practice, social, economic, scientific and technological forces are demanding the serious attention of all concerned with the professional preparation of medical technologists. Federal medical programs, group health practices, centralization of laboratories, automation and electronics in laboratory processes and an enormously increasing demand for tests and services are creating such forces today. The responses of laboratory medicine to these forces will affect profoundly the education of laboratory personnel. To assure improvement in quality of laboratory service and patient care, educators engaged in the professional preparation of medical technologists must seek wisdom in planning and coordinating the curriculum in this period of change.

The National Committee for Careers in Medical Technology in its efforts to recruit personnel and its studies of manpower and training problems realized this need and with the Cancer Control Program of the Public Health Service conducted an interdisciplinary conference on Manpower for the Medical Laboratory in October, 1967, at the University of Maryland. Two hundred of the nation's leading pathologists and medical technologists, clinical chemists and microbiologists, public health and manpower specialists, occupational analysts, hospital administrators, educators, scientists and economists were in attendance. The overall objective of the conference was to provide opportunity for members of the various disciplines to (1) review some of the forces that are changing manpower requirements, and (2) explore ways of staffing medical laboratories that will serve America's health needs more effectively.[1] Reflected throughout the conference was the need for a complete detailed analysis of personnel requirements for operation of a modern

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[1] Manpower for the Medical Laboratory, The National Conference on Education and Career Development of the National Committee for Careers in Medical Technology Oct. 11-13, 1967, (Public Health Service Publication No. 1771), p.7.

clinical laboratory in terms of functions performed and the technical and professional skills required for such performance. This determination of the education, skills, and judgment required to fill medical laboratory roles is of paramount importance in education. Eli Ginsberg, Ph.D., Director of Human Resources, Columbia University, presented this challenge in his address to the conference participants, "It is incumbent upon all leadership groups to make sure that you don't get stuck with the patterns that served you well in the past, but that you develop the flexibility to come out where it makes sense to come out a decade hence."[2]

A set of recommendations evolved from the group discussion and combined thinking of the participants which serve as a basis for further implementation. The recommendations which are of primary interest to the medical technology are:

"Recommendation 9: Colleges and universities should be encouraged to strengthen baccalaureate curriculums for medical technology education, and the current 3-year college plus 1-year clinical training system should be reviewed.

Recommendation 12: New curriculums and teaching methods should be explored, with experimentation encouraged, and self-instruction in laboratory education should be utilized more effectively."[3]

I. THE PROBLEM

Statement of the problem. The problem is to evaluate the medical technology curriculum of the College of St. Scholastica and to make recommendations for curricular implementation.

Purpose of the study. In the spirit of Dr. Ginzberg's challenge, the purpose of this study is to appraise the baccalaureate curriculum in medical technology of the College of St. Scholastica in an effort

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[2] Ibid., p.8.

[3] Ibid., p.11-12.

to seek to identify outmoded pratices of the past and to formulate new patterns aligned to the changes to come in laboratory staffing, personnel utilization, and standards of education and training. It is recognized that such educational patterns must be continuously re-assessed as technological and sociological forces reshape the future.

Importance of the study. The most basic challenge in the world of change is that of creating, maintaining, and improving the conditions of learning. The key to the process of improvement is the quality of available opportunities to develop as individuals. There will be no improvement as long as the goals, motivation, skills, and the help to learn to use the resources and opportunities are lacking.

Recent decades have brought marked changes in the economic, social, and technological situation in Minnesota. In this study the writer attempts to show that the College of St. Scholastica and its medical technology curriculum reflect the society in which it is based; that revisions in the curriculum are produced by pressures from the outside. A curriculum is in itself a reflection of the college. Changes in the curriculum are made only after revisions in the faculty, in the spirit and goals of the institution have already occurred. The inclusion of medical technology in a liberal arts college curriculum is in itself a response to the demand for specialized or vocational preparation.

That a conflict exists in the role of the liberal arts college in higher education is evident in the review of the literature in Chapter II. This conflict between the concept of education as a liberalizing influence and as vocational preparation is felt acutely in liberal arts colleges. The problem of relationship between liberal education and technical or professional education must be of major concern in any study of the undergraduate curriculum.[4] The rapid development of medical technology as an undergraduate professional specialty and the competition between institutions in establishing

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[4]Paul L. Dressel, The Undergraduate Curriculum in Higher Education. (Washington D.C.: The Center for Applied Research in Education, Inc. 1963), p.12.

programs of study led to the formation of the Board of Schools by the American Society of Clinical Pathologists for the purpose of formulating minimum standards of education for medical technologists.

In Chapter III the writer traces the evolution of the medical technology curriculum of the College of St. Scholastica since its inception as a twelve-month training program at St. Mary's Hospital in 1928. In this historical review, curricular change is viewed as adaptation to changing circumstances as knowledge in all fields expands and becomes more specialized. The curriculum changes as the country matures and in turn changes its demands on each generation. This medical technology curriculum represents a series of shifting approximations to meet changing requirements over a period of forty years.

As was pointed out in the Manpower Conference, professional personnel in medical laboratories will increasingly need education for flexibility; the ability to acquire skills not yet identified; to adjust to rapid changes in services and procedures.[5] To meet these needs of the future, guidelines for curricular innovations are stressed in Chapter IV. These suggestions are based on recent discoveries about learning theory, individual differences, instructional methods, and sequential relationships between learning and teaching. Methods of instruction advance through apprenticeship to the classroom and laboratory; from textbook to reference to instructional materials center as technological advances are applied to the learning process.

To assure the continued relevance of the medical technology curriculum, response must be made on a continuing and accelerating basis to the expansion of knowledge, to new insights in teaching practices, as well as to the needs of society. Thus the members of the College of St. Scholastica faculty are watching developments in education with keen interest and are adjusting the college program to capitalize and build upon them.

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[5] Manpower for the Medical Labor atory, op.cit., p.12.

II. DEFINITION OF TERMS USED

Education. Education is the process of growth and development whereby the individual assimilates a body of knowledge, adopts a set of life ideals and develops the ability to use that knowledge in the pursuit of these ideals. Education is becoming, meaning coming into existence and indicating growth, development, emergence.

Professional education. Professional education is the systematic direction and guidance of the student toward the fullest development of his capabilities in the acquisition of science, skills, and spirit of the profession so that he may carry out all his personal and professional responsibilities. Therefore, professional education must be education in principles which have a wide range of application. It must lead to the development of insight and lay emphasis upon exploration, research, and discovery.

Curriculum. The curriculum, the chief planned means for achieving the college's goals, is the schematic arrangement of all the resources employed by the institution to provide students with opportunities for desirable learning experiences that bear directly on the instructional objectives of the college. In the broad sense, the term may refer to the whole body of courses offered in the educational institution, or it may be limited to a sequence of courses in preparation for a particular profession.

Curriculum development. Curriculum development is "that aspect of teaching and administration that designedly, systematically, cooperatively and continuously seek to improve the teaching-learning process."[7] This term refers to the unfolding or evolving of a curriculum through successive stages, each of which is preparatory to the next stage. It includes revision, construction, improvement and planning. The ultimate criterion of curriculum development is more and better learning.

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[6]Ruth M. French. "Education is Becoming", American Journal of Medical Technology, (May, 1968), p.297.

[7]G. Robert Koopman, Curriculum Development, (The Center for Applied Research in Education, Inc. New York, 1966), p.9.

Medical technologist. A medical technologist is one who, by education and training, is capable of performing the various chemical, microscopic, bacteriologic, and other medical laboratory procedures used in the diagnosis, study, and treatment of disease.

Medical technology curriculum. The medical technology curriculum includes the total program followed by the future medical technologist from the time of freshman orientation until his graduation when he is eligible to take a national registry examination for certification as a qualified professional person in his chosen field. Currently this includes three years of academic preparation followed by a twelve-month period of clinical experience in an affiliated hospital.

Clinical experience. Clinical experience refers to the actual practice situations which occur under supervision in a medical laboratory before graduation. Its main purpose is to help the student combine knowledge and skills in application. This experience is organized for the purpose of his learning, not for the purpose of service to the patient although the two do ideally coincide.[8]

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[8] William J. McGlothlin, The Professional Schools, (The Center for Applied Research in Education, Inc. New York, 1964), p.73.

CHAPTER II

REVIEW OF THE LITERATURE

I. THE ROLE OF THE LIBERAL ARTS COLLEGE IN HIGHER EDUCATION

Liberal education can only be understood in terms of its historical development and as an aspect of Western culture. It has undergone a radical change in purpose, content and method in the United States in the past half century. The present curriculum is a result of many impacts, such as depression, wars and post-war conditions, on the liberal arts curriculum.

Aims of liberal education. Dressel describes the objectives of the liberal arts curriculum in the strict sense that was for many years considered the liberalizing influence in aiding students to lead a good life and to become better citizens.

> Liberal education emphasizes broad knowledge of the cultural heritage, the ability to think critically and to make wise judgments, and some awareness of the methodologies of the major disciplines. Liberal education also assumes the ability to communicate one's ideas to others and receive ideas from others. Finally, a liberal education without assuming an indoctrination in a specific set of values, involves the expectation that an individual will attain an effective set of values consistent with liberal tradition.[1]

Rise of professional education. Pressures from environment, needs of society, demands of students, and necessity of economical operation have brought on innumerable expediencies and compromises in the form of curricular expansion. As the values of society change, most Americans seek personal success in life, in marriage, in vocations with the security of job and income. They seek in higher education those knowledges and skills which will help them in some field of work. Most students now enter college as a way to a vocational success.[2]

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[1] Paul L. Dressel, The Undergraduate Curriculum in Higher Education, (The Center for Applied Research in Education, Inc., Washington, D. C., 1963) p.60.

[2] Lewis B. Mayhew, The Smaller Liberal Arts College, (The Center for Applied Research in Education, Inc., Washington, D. C., 1962), p.9-13.

A major curricular trend toward the continuing expansion of professional courses first appeared after World War I and continued through the depression up to World War II.[3] In a detailed study of college catalogues for the period of 1925-1955, Rudy showed that special courses, including medical technology, came to be one of the established features of that period. In some colleges combined programs were worked out allowing students to begin professional preparation in the senior year.[4]

Aims of professional education. "Professional education has the purpose of developing practitioners who are competent, who have social understanding, whose personalities have been moulded to their tasks, who have a zest for continued study, and who can interpret and conduct research."[5] Although the aims of professional education control the content, the basic objectives are not inconsistent with those of liberal education. Earl McGrath discusses the need of society for trained graduates who are professionally educated but who have the depth and breadth of the liberal man in a pamphlet, Liberal Education in the Professions. He feels that the goals of liberal and professional education complement each other and should be integrated rather than separated. McGrath suggests a parallel curriculum structure as best designed for this integration with more emphasis upon the liberal aspects in the early stages and the professional aspects concentrated in the third and fourth years.[6]

Professional specialties are beginning to recognize that rapidity of change requires a return to emphasis on the fundamentals or broad

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[3]Paul L. Dressel, The Undergraduate Curriculum in Higher Education, (The Center for Applied Research in Education, Inc., Washington, D. C. 1963), p.12-14.

[4]Willis Rudy, The Evolving Liberal Arts Curriculum: A Historical Review of Basic Themes. (Teachers College, Columbia University, 1960), p.45.

[5]William J. McGlothlin, Patterns of Professional Education, (G. P. Putnam's Sons, New York, 1960) p.30.

[6]Earl J. McGrath, Liberal Education in the Professions, (Teachers College, Columbia University, 1959), p.60-62.

principles. As vocational curricula move out of the how-to-do it stage into application of principles and concepts, critical thinking, decision making, and judgment become prime objectives. Professional education has evolved through several steps from the apprenticeship to college or university preparation which is recognized as the most advanced stage involving technical and liberal or general education. In the future it may be expected that the professions which reach high social status and acceptance will be those which prepare their members not only for professional competence but also for the activities of civic and personal life.

The future of the liberal arts college curriculum. Over the years American higher education has been involved in a continual argument as to whether its function is to prepare liberally educated citizens for a role in democratic society or to prepare individuals for professions. Two recent studies conducted by the Institute of Higher Learning polled the attitudes and opinions of faculty members in both liberal and professional education. The first survey showed that faculty members in professional schools believe generally that students should have broad liberal education as well as technical instruction. Although the pattern of concentrating liberal arts in the first two years is developing, the study shows that the faculty members prefer it spread over four years. In general, faculties of professional schools are genuinely interested in liberal arts, but are confused as to the ingredients and proportions that should be put together to provide liberal education for professional students.[7]

Implications emerging from the second survey indicate that the attitudes of liberal arts faculty members are quite similar. Both groups support the belief that liberal arts enrich the education of

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[7]Paul L. Dressel, Lewis B. Mayhew, Earl J. McGrath, The Liberal Arts as Viewed by Faculty Members in Professional Schools, (Teachers College, Columbia University, 1959), pp.57-61.

college students and make them not only better persons but also better members of a profession. Some liberal arts faculty members prefer to teach the vocationally oriented student for he has a definite goal and more maturity. Differences appear only in the amount of liberal arts required as appropriate and necessary to achieve the qualities associated with a liberal education.[8]

These facts suggest the need for both groups to join in an effort to design undergraduate programs for professional students which introduce them to the world of learning outside their vocations while at the same time cultivating technical competence. As our dynamic society moves from the horse and buggy era into the space age, it is imperative that both liberal arts and professional educators submerge their personal and traditional prejudices in an effort to provide a more useful higher education for those who will determine our destiny as a nation.

II. MEDICAL TECHNOLOGY EDUCATION

The Registry of Medical Technologists. The profession of medical technology appeared about the time of World War I. Prior to that period the pathologist performed his own laboratory tests. As the field of laboratory medicine developed and broadened, the pathologist found it necessary to train assistants to help him perform the simpler tests. In the beginning, individuals who had not graduated from high school became apprentices in medical laboratories. Then a few commercial schools were established, but this training was inadequate and the fees were exorbitant. Realizing that laboratory medicine was developing rapidly, and that something must be done to standardize the training of these laboratory assistants, the American Society of Clinical Pathologists (ASCP) established the Board of

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[8]Paul L. Dressel, Margaret Lorimer, Attitudes of Liberal Arts Faculty Members Toward Liberal and Professional Education, (Teachers College, Columbia University, 1960), pp.53-54.

Registry of Medical Technologists in 1928 as a standing committee of ASCP.[9] Through its efforts to standardize the training of medical technologists, the Registry has come to be universally accepted as the authoritative organization for certifying medical technologists in the United States. It has elevated the status of the medical laboratory worker to a high professional level by gradually raising the educational requirements and broadening and improving the technical training.

The Board of Schools. As the Registry began to function it was soon found from applications of students requesting to become registered that the type of training received by these students varied greatly from school to school. On the basis of information obtained from a questionnaire, the Registry published a list of 215 hospital schools of medical technology in 1933.[10] The same year the ASCP asked the Council on Medical Education and Hospitals of the American Medical Association to work with the Registry on essentials for schools and to inspect and approve schools of medical technology. The first list of ninety-six approved schools was published in the Journal of the American Medical Association in August 1936.[11] With the rapid growth of the number of schools, the Council asked the ASCP for assistance in its evaluation program in 1949. As a result, the Board of Schools of Medical Technology was established by the ASCP for the primary purpose of maintaining high standards of education in approved schools and the development of new schools through evaluation and inspection. The Board acts in an advisory capacity to the Council on Medical Education of the American Medical Association which is the official approving body for schools of medical technology.

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[9] Bulletin of the Registry of Medical Technologists of the American Society of Medical Technologists, (45th ed. 1966, Muncie, Indiana), p.1.

[10] ASCP Board of Schools of Medical Technology, Guide Book for an Approved School of Medical Technology, (3rd ed., 1962, Muncie, Indiana), p.3.

[11] Ibid.

Approval of schools for training medical technologists. Although the primary function of the Board of Registry is the certification of properly qualified medical technologists, it has always encouraged the establishment of high standards in the hospital schools where medical technologists receive their clinical experience. Soon after the Registry became established, rules and regulations for the guidance of the schools were formulated since they were considered essential for the maintenance of the high standards which had been set. When the Council on Medical Education assumed its present function of investigating and approving schools of medical technology, it adopted as the basis for its approval the minimum requirements as set down by the Board of Registry.[12]

Over the past twenty years the number of approved schools has increased to the recent listing of 771 in 1966. These schools are encouraged to affiliate with accredited colleges and universities whereby an educational sequence of three years of college and one full year of clinical experience will lead to a baccalaureate degree. This affiliated program should be a cooperative effort with a strong liaison between the college and the approved school. With this arrangement the pre-clinical work will be satisfactory to the approved school and the clinical work, including both practical and didactic instruction, will meet the collegiate requirment for a degree in medical technology.[13]

III. PROFESSIONAL CURRICULUM DEVELOPMENT

Before reviewing the evolution of a professional curriculum, it is helpful to recognize some of the facets of curriculum development. The instructional program may be considered in terms of basic purposes,

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[12] Bulletin of the Registry of Medical Technologists, op cit., p.16.

[13] ASCP Board of Schools, op cit., p.1.

functions, and structures. An objective view may serve to give a clearer and broader understanding of the factors which have determined its direction in the past.

Characteristics of a professional curriculum. In an article, "Professional Demands for the Curriculum", a question is raised concerning the curricular implication of the fact that we are preparing professional people rather than members of a skilled trade. Five important characteristics that may furnish the keynote of all considerations regarding professional curriculum development are presented as follows:

1. The work of a profession is directed toward the common good, toward accomplishing something vital to the well-being of society.
2. Professional work is built upon specialized knowledge and skills.
3. A profession earns and maintains a certain recognition from the public because of its competencies. This is an asset as well as a mark of responsibility.
4. The profession is responsible for the maintenance of standards.
5. Professional work calls for a lifetime of continued in-service study and research.[14]

It follows that education for any profession can no longer be defined in terms of the completion of some prescribed courses. Education is spoken of as a process of changing the behavior patterns of people. One of its functions is to broaden and deepen the student's interests so that he will continue his education after the formal training is ended.[15] Education must emphasize the development of a series of experiences which will develop in the student both the desire and the ability to continue his own education.

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[14]Sr. Elizabeth Ann, "Professional Demands for the Curriculum," (Hospital Progress, 45: 96) February, 1964.

[15]Ralph W. Tyler, Basic Principles of Curriculum and Instruction, (University of Chicago, 1950), p.17.

Stages of curriculum development. The task of curriculum development has at least four significant aspects, according to Dr. Loretta Heidgerten. These are:

1. The determination of the educational direction, referring to a clear definition of the desired objectives.
2. The selection of the curricular experiences (subject matter and learning activities) which are likely to lead to the attainment of the desired objectives.
3. The organization of the curricular experiences into a curriculum pattern which is likely to lead to the attainment of the objectives. This pattern refers to the sequence of courses and learning experiences, including theoretical courses and directed field experience.
4. The determination and development of principles and procedures by which changes in the curriculum can be made, evaluated, and sustained.[16]

The identification of stages in the development of a course or curriculum promotes the wrong idea of the discreetness of the stages. The complex relationships existing among the stages are suggested in Figure I according to Dressel.[17] Revision may involve alteration or replacement of any or all of the four stages.

Approaches to curriculum development. The first approach to curriculum development consists of the day to day adjustment of curriculum organization, instruction, assignments, and placement of laboratory periods to bring all of them into closer alignment with the objectives or with new research. It may also involve a short

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[16]Loretta Heigerten, "Factors Affecting Curruculum Development," (C.H.A. Medical Technology Workshop Manual, 1959) p.72.

[17]Paul L. Dressel, The Undergraduate Curriculum in Higher Education, (The Center for Applied Research in Education, Inc., Washington, D.C., 1963) p.25.

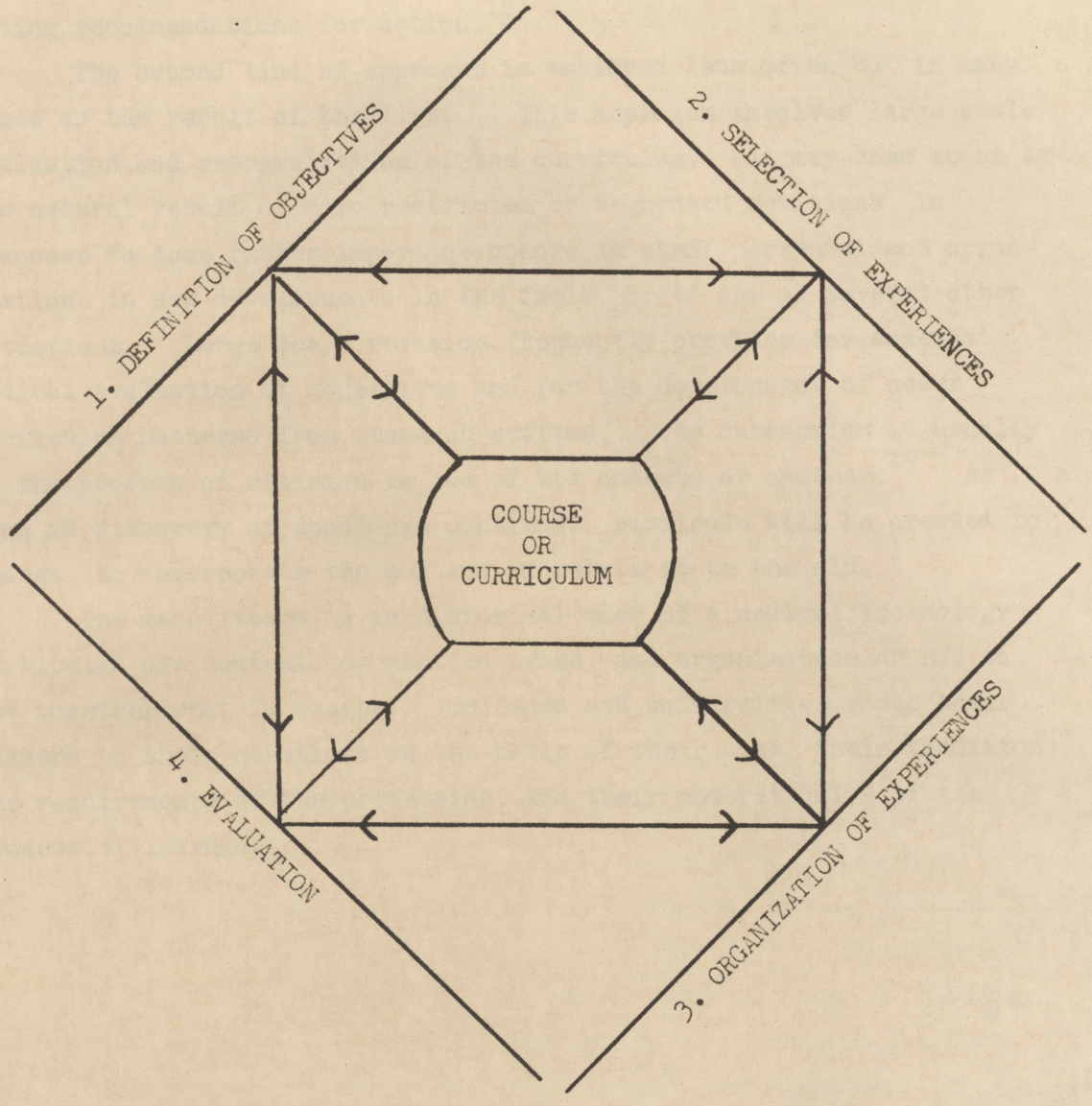

FIGURE 1

INTERACTION AMONG STAGES IN CURRICULUM PLANNING[17]

range study of some aspect of the program with faculty groups formulating recommendations for action.[18]

The second line of approach is employed less often but in many cases as the result of the first. This approach involves large scale evaluation and reorganization of the curriculum. It may come about as the natural result of more restricted or segmented revisions, in response to some rather important change in staff personnel and organization. to new developments in the field, or to one of several other situations. Large scale revision frequently provides for somewhat radical evaluation of objectives and for the development of newer curriculum patterns from these objectives. The curriculum is usually in the process of revision in one of its aspects or another.[19] As long as discovery of knowledge continues, curricula will be pressed to change, to incorporate the new and to relate it to the old.

The main issues in an historical view of a medical technology curriculum are content, or what to teach, and organization or how to put together what is taught. Colleges and universities reach their answers to these questions on the basis of their aims, their traditions, the requirements of the profession, and their understanding of the process of learning.

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[18] Sr. Elizabeth Ann, "Development of the Medical Technology Curriculum." (Hospital Progress, 44: 54, September, 1963).

[19] Ibid.

Taken from thesis -
"An Appraisal of the Medical Technology Curriculum of the College of St. Scholastica" -
Sr. Marguerite Baxter

Complete copy will be ready in August.

CHAPTER III

A HISTORICAL REVIEW

I. ORIGIN OF THE MEDICAL TECHNOLOGY CURRICULUM (1901-1935)

St. Mary's Hospital clinical laboratory.

Although St. Mary's Hospital was opened in 1888, no record of any laboratory work is available until 1901 when two interns fitted out a box in which they kept the necessary solutions and apparatus to do some simple determinations on the blood and urine. . . . The little box was abandoned in 1905 when Dr. E. L. Tuohy set up a microscope in a small room where laboratory tests could be performed by the interns. In 1915 Sister Petronilla was assigned to help with "laboratory work". Upon completion of a course for laboratory technicians at Marquette University, Sister Severin assumed the supervision of the laboratory in 1917. The variety and volume of tests increased steadily and in 1923 Dr. George Berdez joined St. Mary's Hospital staff as its first full-time pathologist.

Shortly after the arrival of Dr. Berdez the laboratory inaugurated an eight-months training course for laboratory technicians. Its purpose was to enable the graduate to perform clinical procedures which allow the physician to establish a diagnosis of disease, to determine the treatment, and to follow the progress of the disease. At this time the entrance requirement was a high school graduation, but in 1925 all applicants were required to have one year of college. Beginning with 1928 at least two years of college were required and the practical training period was increased to twelve months. During this same year, the National Board of Registry began to function under the auspices of the American Society of Clinical Pathologists (ASCP). When the Board was ready to register technologists as qualified, and to approve hospitals as meeting the standards for training technologists, St. Mary's teaching staff was officially certified. The teaching unit received its document of approval by the ASCP in 1932 and the name of St. Mary's Hospital School of Medical Technology appeared on the first list of Schools Approved by the American Medical Association published in 1936. At this time the quota was set at four students per year.

Baccalaureate program at the College of St. Scholastica.

The College of St. Scholastica began to function as a liberal arts college for women in the early twenties with courses designed primarily for young women who were looking forward to becoming homemakers or teachers. Its first baccalaureate degree was awarded in 1926. The depression had its effect on the college and income and budgets were reduced. With the unemployment of the early thirties, the number of openings for teachers decreased and students began to shift their interests to other fields. The administration and faculty accepted the challenge and introduced new educational programs such as medical and nursing technology to meet the needs of the times. The inclusion of vocational subjects necessitated by these new curricula met with some opposition at this time, for it ran counter to the traditional concept of a liberal education. As the time passed the new programs found support and were expanded and strengthened.[1]

The training course for laboratory technicians at St. Mary's Hospital was raised to a collegiate level in September 1935 by increasing the requirements to three years of college following a curriculum selected primarily for students desiring to become medical technologists. The college catalogue for the year 1934-1935 includes the first description of the course in Laboratory Technology as a baccalaureate program with the clinical experience at the hospital serving as the fourth collegiate year. The college-affiliated "Approved School" became a functional part of the academic institution in which the student spent a prolonged period of directed practice.

This new baccalaureate program was described in the college catalogue as a course in combined theory and practice. Its purpose was not to begin professional work as such but to provide the foundation which is necessary to make the professional person truly "professional". Students electing this program, devoted three academic years to theoretical preparation at the college during which they accumulated 135 quarter credits in the arts and sciences as follows: English - 15 cr., Zoology - 20 cr., Chemistry - 40 cr., Language - 15 cr., Physics - 5 cr., and Electives - 40 cr. The electives included anatomy, psychology, sociology, and physical education.

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[1] St. Scholastica, College of, The First Fifteen Years of the College of St. Scholastica. A Report of the Effectiveness of Catholic Education for Women, Fordham University Press, 1947, p. 16.

After the period of theoretical preparation, the student entered a period of one calendar year in the laboratories of St. Mary's Hospital. Practical training resolved itself into a rotating service in all branches, including radiology. During this twelve-month period, the student earned a total of 45 quarter credits. Upon successful completion of all requirements, the student received a Bachelor of Science degree in Medical Technology from the College of St. Scholastica.[2]

II. DEVELOPMENT OF THE MEDICAL TECHNOLOGY CURRICULUM

1936 - 1937.

By the summer of 1936 the first year of the new medical technology baccalaureate program had been completed and the first class of seniors was ready to begin the professional course at St. Mary's Hospital. During this summer of 1936 the educational program received further approval by the Council on Medical Education and Hospitals of the American Medical Association with an increased quota of 5 students. According to a brochure circulated by the Department of Medical Technology, the new program had already been modified with an extension of the training course to a fifteen months period. This senior internship, as it was called, consisted of monthly intervals spent in the various clinical areas, i.e. urinalysis, hematology, chemistry, histology-metabolism, and bacteriology-serology-parasitology. An unbroken service of six months was devoted to radiology and electrocardiography. This system of rotating every month enabled the student to repeat the same technique a number of times and to firmly fix the routines that accompany each service as in an apprenticeship. This laboratory service entailed an eight hour work day in the laboratory with an allowance of two hours absence for class and study. Students were subject to call on Sundays, but were free on Saturday afternoons. When well enough advanced to carry the responsibility, they were subject to night service in turn.

A second major curriculur change was introduced in the junior year with the addition of what was called "junior practice." The student was expected to spend two to five hours each week end in the hospital laboratories learning to do urinalysis, blood counts, gastric analysis, and

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[2] Bulletin of The College of St. Scholastica, Duluth, Minnesota, 1934 - 1935.

clerical work. The junior practice did not carry any academic credit, but the completion of the work was required before the senior internship could be considered.

The new brochure also spelled out new requirements for the first three academic years. Required courses now included Anatomy and Physiology, Mathematics, and the History of Civilization. The physics requirement was raised from five to ten credits, while English was cut from fifteen to nine credits. This latter change as well as the decrease of electives to ten credits caused some consternation among the liberal arts faculty members. At the end of the first year of its existence as a degreed program, curricular changes already indicate the pressure of professional demands on the liberal arts curriculum with additional time being alotted for clinical practice in both the junior and senior years.

The first Bachelor of Science degrees in Medical Technology were awarded by the College of St. Scholastica in 1937.

1937 - 1938.

With the beginning of the school year 1937-1938, the academic calendar of the college changed over from the quarter system to semesters; thus causing another curricular revision as each department reviewed its major course offerings. The new medical technology requirements followed the previous pattern with the conversion to equivalent semester credits for the majority of the courses. However, an increase of an average of two semester credits was granted in English, chemistry, physics, and the biological sciences. The senior year remained the same with an equivalent of thirty semester credits.

1938 - 1945.

During the next seven years the pendulum began to swing to the liberal arts side of the balance as the curriculum shows the effect of faculty opposition to its highly technical pattern. Although the professional educators realized the value of general education, they felt that a

greater need existed for early scientific specialization through the fulfillment of pre-requisites in chemistry and in the biological sciences. New general education requirements were set for the entire college which included courses in philosophy and the social sciences and increased the credit requirement in language and English. Since the academic institution was responsible for granting the baccalaureate degree, it seemed only logical that the professional course be reorganized to meet the need.

In the struggle for survival that followed, the six month radiology rotation was discontinued with the class of 1940. According to a bulletin issued to provide supplementary information for students in medical technology in July 1942, the junior practice was dropped and the fifteen month internship was retained. All students were now required to carry an additional academic load of twelve credits during the senior year. Since they spent the entire working day in the clinical laboratories only during the summer months, this fifteen month period was required to provide the experience prescribed by the ASCP Board of Registry. At this same time, the academic value of the clinical experience was cut rather drastically from thirty to eighteen semester credits while its course content remained basically the same. The 1942 bulletin describes the instruction and practice given in the clinical laboratories as an integral part of the specialization. For instruction correlated the basic and clinical sciences and supervised practice developed technological skill. The new 1942 course requirements are listed in Tables I-IV. in the Appendix.

Other new developments occurred during this same period. The Blood Bank at St. Mary's Hospital opened in 1943 enabling the student to receive a new type of experience in blood group serology. The quota of the Approved School was increased to twelve students each year. Meanwhile the college administration and faculty were viewing the multiplicity of departments which had arisen with the introduction of new curricula during the past decade. In an effort to simplify administrative matters, the medical technology curriculum became a branch of the Biology Department which functioned under the Division of Natural Science.

1945 - 1950.

The acceptance of vocational aim as a legitimate function of the liberal arts college came rather slowly and reluctantly to most of the faculty members of the college. Important changes in the traditional attitude were occurring during this period and many of the liberal arts faculty members began to recognize their obligation to students and attempted to face realistically the need of providing appropriate vocational help to young women. To clarify the thinking of the faculty as to the function of a liberal arts college of this type and to identify more clearly the needs of its students, the faculty conducted a follow-up study of its graduates from 1926 - 1941. Questions were devised to help ascertain how effectively the college had met the challenge of preparing students for a vocation and of helping them adjust to their work. From the results of this survey the faculty members were able to view the new programs differently and to develop plans for appropriate adjustments.[3]

Several factors combined to influence the direction of the medical technology curriculum in 1945. With an increased quota of 12 students at the hospital laboratories, the groups were now too large to be handled efficiently during the summer months. The students beginning their senior internship appealed to the college administration requesting an investigation of the situation. The administration met with the Director of the Approved School at the hospital and a compromise arrangement resulted from the investigation which satisfied the students, laboratory staff, and the college administration for a few years.

The revised sequence appeared in the college bulletin for 1947 under the Department of Medical Technology which was now included in the Division of Service Arts. With the increased language requirement the students were eligible to receive the Bachelor of Arts degree which was esteemed higher than the Bachelor of Science degree at this institution. The major revision stemmed from the reduction of the fifteen month senior internship to a twelve month period of clinical experience. To fulfill the Registry prescription that one full year be spent in the Approved School, the students were required to be in the laboratories forty hours each week exclusive of their college classes

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[3] The First Fifteen Years of the College of St. Scholastica. op. cit., p. 7

which they attended after the working day at the hospital. Medical Microbiology, Histology, and Hematology, formerly taught in the senior year, were introduced in the junior year. A course in pathology was added to the senior year sequence, thus keeping the total of eighteen credits. In order to meet the minimum of 124 credits for graduation, students were expected to earn nine to twelve credits of electives at summer school. The specific course requirements in physics, mathematics, and social sciences were discontinued at this time.

1950 - 1955.

The success of the medical technology curriculum in its early stages can be traced primarily to the influence of a most dynamic person, Sister Alcuin Arens, who served as the Head of the Medical Technology Department during this period. Having received her certificate as a laboratory technician from St. Mary's Hospital in 1928, Sister Alcuin received a B. S. degree in Chemistry from the College of St. Scholastica in 1930, and a M. S. degree in Physiological Chemistry from the University of Minnesota in 1937. She was a registered nurse as well as an ASCP registered medical technologist. In addition to twenty three years of full and part time teaching at the college, Sister Alcuin supervised the clinical laboratories for six years.

Professionally Sister Alcuin was one of the most prominent medical technologists on the national scene serving as vice president of the American Society of Medical Technologists in 1936-1937, and as its secretary from 1944-1947. She is remembered as the organizer of medical technology in Minnesota and was the first president of the Minnesota Society of Medical Technologists in 1936-1937. Besides finding time to serve on national committees, Sister Alcuin published three books and twenty six articles pertaining to various facets of medical technology. At the time of her unexpected death in 1954, Sister was putting the finishing touches on the last chapter of a manuscript, "About Medical Technology". which was virtually a chronicle of the new profession.

In an address to the American Society of Medical Technologists at Boston in 1951, Sister Alcuin discussed her views on the primitive and chaotic state of medical technology education. She felt that it was time to recognize the fact that the process of medical technology education

must be based on the same pedagogical principles as other sound systems of education. She attributed the lack of a written record stating the objectives of medical technology education to the fact that it had been an education without educators. The surgeons and pathologists who were held responsible for the profession in its beginnings held it only as a secondary interest. Sister was critical of those who considered medical technology as a primitive rote process of learning requiring one full year of practice which they erroneously termed "training." She insisted that not only knowledge, but also a great deal of independent technical judgement was required in the clinical laboratory and that the medical technologist must be an informed member of the health team.[4]

In August of 1954 Sister Alcuin called a meeting of the key personnel involved in the college's medical technology curriculum for the purpose of strengthening it through cooperative planning and reorganization. The different orientation of college and hospital personnel toward the educational program caused a continual conflict with regard to the senior year which still included religion and philosophy courses in addition to the clinical experience. Both groups submitted proposals for a reapportionment of credits in the senior year, but the matter was still pending when Sister Alcuin died in October of the same year. A synopsis of semester credits for the 1954 curriculum is presented in Tables I-V in the appendix.

1955 - 1962.

During the years immediately following the death of Sister Alcuin, the curriculum showed a trend toward an increase in the general education requirements of the college with the addition of courses in sociology and economics. On the whole there appeared to be little coordination between the academic and clinical years. The pathologist was now listed as the Head of the Medical Technology Department, but it was through the efforts of the instructors in the natural sciences that the curriculum managed to keep afloat.

In 1955 the hospital's proposal for the reapportionment of credits was adopted bringing the total value of the clinical experience to nine-

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[4]Arens, Sister Alcuin, "Medical Technology - Educational Problems" (paper read at the 1951 Convention of the American Society of Medical Technologists at Boston, Massachusetts.)

teen credits. A subsequent appeal for a further increase in these credits was disregarded by the college. At this time the course in philosophy was removed from the senior year sequence so that the students took only one class at the college at the end of the working day in the laboratory. When the Registry of Medical Technologists introduced a mathematics requirement for certification, it was necessary to drop one semester of Zoology to allow the introduction of mathematics in the freshman year program.

A few years later the Registry modified the requirement in the biological sciences to include one full year of biology or zoology. This coincided with the Biology Department's plans for a two semester integrated course in biology in 1961. Members of the biology and chemistry departments met with the pathologist to reexamine the medical technology sequence. The resultant plan was not too practical because it required students to carry a very heavy credit load during most of the academic years. The pathologist requested the addition of one full year of physics, thus necessitating an increase of a second semester of mathematics as a pre-requisite. The general education requirements now included two semesters of psychology. To ease the credit situation the two credit courses in histology and hematology were combined to form the three credit Histo-Hematology. Eight credits of Inorganic Chemistry now replaced the former six credit course and three credits of qualitative analysis. The revised sequence was tabled by the Faculty Curriculum Committee in the spring of 1962.

Significant changes had taken place meanwhile at the hospital. In 1957 the new west wing was completed and the laboratory occupied the entire second floor. The increase in space and modernization of equipment prompted a request for an increase in student quota to fifteen per year. This was granted by the Council on Medical Education in the five-year survey of 1959.

1962 - 1965.

In April of 1962 liaison between the college campus and the clinical laboratory was strengthened by the appointment of a medical technologist from St. Mary's Hospital to the college faculty as Medical Technology Coordinator. In this capacity the medical technologist directed the educational experiences in the clinical area and served as departmental adviser for all students enrolled in the collegiate program. In addition to providing the students with direct professional contact and guidance during the formative years, this arrangement offered increased opportunity for both recognizing and developing the potential of the underclassmen and for directing students not suited for medical technology into other areas before the year of specialization.

With full realization that the future of the medical technology curriculum depended on a better working relationship between the two institutions the coordinator proposed a four year collegiate program to be followed by a year of clinical experience during which a worthwhile stipend and housing would be provided by St. Mary's Hospital. The proposed sequence combined the general education requirements of the college with those defined by the Board of Registry and provided the student with the equivalent of a divisional major in the Natural Sciences. During the senior year the student would spend twelve hours each week at the hospital in directed clinical practice. This experience in basic techniques would qualify him to receive remuneration during the fifth year of clinical experience. Following this proposed sequence the student would receive a B. A. or a B.S. degree following the fourth year but would not be eligible to take the national examination for certification until the clinical year had been completed.

Having received the approval of the hospital administrator and the pathologists, the proposal was submitted to the college administration in the summer of 1962. Hesitant to change the status quo of the traditional pattern of three academic years plus one of clinical experience and fearful of difficulty in recruiting students for a five year program, the administration rejected the idea as being too radical a change for this small liberal arts college.

In the fall of 1962 the sequence which had been tabled by the Curriculum Committee was modified and resubmitted for approval with the suggestion that individual students might be counseled to utilize an additional summer session to ease the heavy credit load. In order to make space for two semesters of Physics in the third year, Histo-Hematology and a social science were postponed until the fourth year. The language requirement was discontinued, thus necessitating a change from a B. A. to a B. S. degree in Medical Technology. Although the modified sequence was unsatisfactory in many respects, it was approved by the Curriculum Committee as a temporary measure with the realization that further remedies to the problem were under consideration.

Unrest was evident among the medical technology students during the early sixties. Both the heavy course load and dissatisfaction with the clinical experience caused several students to transfer into other fields leaving only two students in the graduating class of 1963. Prior to 1962 the seniors had complained of a lack of faculty interest and guidance and considered the nineteen credits a meager recompense for the time and effort devoted to the clinical experience. The new coordinator recognized the complaint was justified, and yet understood the doubt in the minds of many of the college faculty as to the academic value of some of the practical work at the hospital. In an effort to base the senior year on a more solid foundation the entire rotation through the various clinical areas was reorganized and geared toward a higher academic level. By allowing five supervised hours of clinical practice as the equivalent of one lecture hour, the nineteen credits assigned to the clinical experience were increased to twenty three credits. This included a four credit seminar presented by the pathologists at the hospital. Several modifications were made in the policies followed at the hospital which made it possible for seniors to participate more fully in college functions. This raised the students' morale considerably although the problem of taking three additional classes in the fourth year still remained. The course requirements for this period are listed in ~~Table I.~~ Appendix A

Meanwhile steps were being taken by the college administration and faculty to bridge the gap between the liberal and professional curriculums by pursuing the similarities in their objectives. In the North Central Liberal Arts Study of 1964 the faculty formulated a new Statement of

Purpose for the college and sub-committees were set up to review the objectives of the college according to intellectual climate, value judgements, social awareness and professional responsibility. A campus climate survey was conducted among the students in an effort to determine whether the objectives were being achieved with the present students. A significant change in the attitude of the college faculty toward the professions during recent decades is noted in the following Statement of Purpose:

> "The College of St. Scholastica, as a Benedictine liberal arts college, exists to provide an environment in which students, without prejudice to race or creed, can develop intellectually, spiritually, emotionally, and physically during their undergraduate study in the liberal arts and sciences and the professions. Thus, while they are preparing for graduate study, for a professional career, and/or for an enriched personal and vocational life, they are given opportunity for social-civic involvement, for clarifying and deepening ethical and spiritual values, and for campus experiences leading to social competence and poise, leadership and responsibility, and the formation of close personal relationships with faculty and fellow-students."

1965 - 1967.

The formulation of the new statement of purpose, the redefinition of the objectives of the college and the evaluation of the campus climate survey prepared an ideal setting for a general curriculum study that was undertaken as the North Central Liberal Arts Study in 1965-1966. Because of the excessive fragmentation of curriculum the students were being asked to think in many directions at once and to make radical shifts from one discipline to another. The faculty recognized that a re-evaluation and revision of course offerings could lead to a more unified curriculum and provision for larger time blocks which would allow for greater depth in thinking. Realizing the importance of having a broad basic knowledge and the ability to adapt to a dynamic society, faculty sub-committees redefined the general education requirements embracing the major fields of knowledge including courses in the humanities, theology, philosophy, social sciences, and natural sciences.

The professional curriculums were regrouped into a more productive relationship and sequential patterns were established in the arts and sciences upon which the vocational fields are based. Now functioning under the Division of Health Sciences, the Departments of Medical Technology, Nursing, Dietetics, and Medical Record Science gained mutually by making use of carefully planned fundamental courses and by eliminating unnecessary specialized courses. Attempts were made by each department in the college

to reduce duplication in course offerings and to combine instruction where possible.

In September 1965 the Department of Medical Technology once again obtained the Curriculum Committee's approval for changes in its major requirements as listed in Tables I and II. The course in physics had not proven beneficial since it was not designed to meet the needs of the medical technologist in the area of instrumentation as used in the clinical laboratories. By deleting this course and the second semester of mathematics, which had been its prerequisite, the heavy load was decreased by eleven credits. In view of the age of automation and the extensive use of electronic devices in clinical medicine, the possibility of integrating more instrumentation in the courses in analytical chemistry was suggested to the chemistry department for consideration and implementation. Further steps were taken to include instrumentation in the seminar presented in the senior year.

Additional changes were taking place in the clinical experience and the course titles were no longer descriptive of the instructional content. To remove the connotation of the outdated technique approach, course titles were changed accordingly. An increase in the credit value of each course was obtained ~~as listed in Table II~~ bringing the total value of the clinical experience to twenty nine credits. Under this arrangement four hours of supervised practice were allowed as the equivalent of one lecture hour and a week's assignment in each course was considered as thirty six hours of combined practical and didactic work.

These curricular modifications of 1965 appear as a highlight in the development of the curriculum. A new course sequence permitted the students to fulfill all of the major and general education requirements without overloading their schedules at any point during the four year program. However, a multiplicity of three credit courses still remained and the students carried an average of six courses at all times. This problem was under consideration in the general curriculum study.

1967 - 1968.

The new general education requirements resulting from the curriculum study were welcomed by the Medical Technology Department. (Appendix A) ~~(Table I)~~ The consolidation of courses in literature, speech, and western culture into an integrated humanities block caused a further decrease both in the

number of credits and courses required of all students. Other two and three credit courses were deleted or combined in theology, philosophy, and the social sciences. In September of 1967, the course sequence for medical technologists was set up to include only four courses of four credits each in addition to a one credit course in physical education for each of the first two years. The third year still included three credit courses in the sciences.

In an effort to promote an exchange with the University of Minnesota, Duluth, which would make it possible for students to take advantage of courses taught on another campus in the vicinity, the administration and faculty turned their attention to the adoption of the quarter system. The existing calendar year of two semesters allowed for such exchange only on a very limited basis. Although much work had been devoted already to the planning of new semester courses to meet the revised general education requirements, the decision was made to convert to the quarter system with the academic year of 1968-1969.

Other changes were under consideration by the medical technology coordinator because the acceleration of laboratory medicine at St. Mary's Hospital was not being met with a proportionate increase in available qualified personnel in the Duluth area. An effort had been made in recent years to employ medical laboratory assistants to perform the more routine tasks so that the services of the medical technologists could be utilized more efficiently. Even so, the dearth of technologists was having its effect on the education of the students. Since the primary obligation of the staff technologist is patient care, the student's basic instruction was at times relegated to those less qualified under the pressures of an increased work load. Although the clinical facilities were approved for fifteen students, the class of eleven students proved to be a challenge for the laboratory staff in 1967-1968.

In view of the trend that medical technology education seemed to be taking across the nation, and the recommendations of the Manpower Conference presented in a previous section of this paper, it seemed advisable to consider introducing our students to the profession prior to the senior year. Some of the medical technology presented in a twelve month period in a tutorial relationship could be adapted and taught more efficiently to larger groups of students in non-clinical facilities by individuals

having the proper qualifications and an interest in teaching. Following this plan students could receive basic instruction in the principles of medical technology at the college before entering the clinical area for further experience. The current twelve month period of clinical experience prescribed by the Board of Schools is being challenged by the University of Minnesota where an experimental program of this nature is planned for 1968-1969. Although plans for St. Scholastica's new science building had been finalized and construction was well underway, a request for space for a medical technology laboratory in the science building was granted during the winter of 1968. This laboratory is scheduled for completion during the summer of 1969.

The conversion of the college to the quarter system at this time offers many advantages. As semester courses were modified and the content was rearranged and adapted to quarter courses, a more practical sequence was devised. A major revision of the medical technology curriculum was submitted for approval with the intention that it be further modified within the next few years to provide for growth and improved instruction. Course descriptions and the major requirements approved by the Curriculum Committee in February 1968 are given in the Appendix. In the future the student will be introduced to various aspects of the profession early in his career through an orientation course in the freshman year and case presentations in the sophomore year. Courses in hematology, immunology, and clinical chemistry will serve to enhance motivation as well as to provide basic instruction in the junior year. At present these courses are limited to theory only by the lack of teaching facilities. However projected plans include the utilization of the new medical technology laboratory for these courses.

CHAPTER IV

RECOMMENDATIONS FOR CURRICULUM REVISION

I. PROCESSES OF CURRICULUM REVISION

The development of a curriculum can be better understood by examining its relationship to curriculum revision. According to Koopman, curricular revision is a transition which lays the foundation for curricular development. It consists of three processes:

> "1. Revaluing and reconsidering the curriculum in the light of changed conditions in a society.
> 2. Reorganizing the curriculum in terms of new educational knowledge of a technical nature, such as findings about the psychology of learning.
> 3. Revising courses of study based on both newer social conditions and changing technical knowledge concerning education." [1]

The presence of continuing and thoughtful revision is essential if education is to remain a dynamic, stimulating enterprise. This revision may involve alteration or replacement of any or all of the stages of curriculum development: definition of objectives, selection of experiences, organization of experiences, and evaluation. (Figure 1, page 15).

Definition of objectives. To prepare objectives for the program and for the selection of subject matter for the curriculum one must look to the basic education of the medical technologist, the current practices of the clinical laboratory, the motivation of the students, and the social and educational needs of the professional person. Objectives are derived from the needs of the students, needs of society, the statement of purpose of the academic institution with reference to its educational philosophy, and the

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[1] Robert G. Koopman, Curriculum Development, (New York: The Center for Applied Research in Education, Inc., 1966), p.4.

known principles of learning. Objectives should be stated clearly so as to make evident to the student what he is expected to achieve by his educational experience. Having accepted the objectives, the student may look at the kinds of assignments and educational experiences laid out for him more critically and recognize their relevance in the achievement of the objectives.

Organization of experiences. In the past the organization of learning experiences may have been more of an historical accident rather than of necessity even though it may have seemed logical. The curriculum should be intellectually unifying, and promote the correlation of theory and practice. Curriculum materials should be so organized that there will be no gaps, and a minimum of overlapping. The experiences should be so related and so arranged that what is learned in one experience serves to enrich and make more meaningful the experiences that follow. The curriculum should be organized so that there is emphasis and proportion according to the relative importance of the various learning experiences and content. If effective learning is to be achieved, curricular activities will have to be selected and organized in accordance with sound psychological principles of learning.

In applying principles of organization, essentially three criteria should be utilized. There must be continuity, that is, learnings provided by earlier experiences must be used in later ones. Repetition with deeper insights and an expanding range of association promotes learning. This should be aided by sequence or the continuing use of an idea proceeding to greater depth and complexity. Learning experiences should be so planned as to be cumulative rather than discrete. Thirdly, if the learning experience is to take on its fullest meaning there must be integration. It must be related to learning in other courses and to experiences outside of the classroom.

Evaluation. Curriculum development is a continuous process, therefore the curriculum should be constantly evaluated in order to adapt to the changing needs of the learner, the profession, and

society. The impact of the curriculum can be measured by comparing the students' status before beginning the program or course with their status at its conclusion. The changes noted may be taken as indicative of the effectiveness of the experiences. If alternate patterns of experience exist, comparisons may be made by contrasting the changes noted under each pattern.

II. THE CHALLENGE OF CHANGE

Curriculum change is social change. Until recently it was thought that curriculum change consisted largely of developing and installing new courses of study. It is now recognized that curriculum change is a process involving the personalities of the students, teachers, administrators; the structures of the school; and patterns of personal and group relations among members of the school and community. Planning for change involves much more than shifting courses around in an old structure, it may mean replacing the structure. On the deterring side, there is always the fear of structural change because its results cannot be readily anticipated in advance.

Approach to curriculum change. To be successful, curriculum change must be a combination of both the teachers' approach and the administrative approach. It must be systematically planned and based on solid assumptions. The curriculum will be improved only as the professional competence of the teachers improve. The competence of the teachers will be improved only as the teachers become involved personally in the problems of curriculum development. It is important for the teachers to feel that they are a part of the decision to change the curriculum as many reject what they do not know because they do not know it. If teachers share in selecting and stating the objectives to be attained, in selecting learning activities and subject-matter content, in judging and evaluating the results, their involvement will be assured. It will be a challenge to choose from among the skills and concepts and to formulate a curriculum that will meet the opportunities of our age. The key to successful innovation is providing assistance to teachers as they begin to implement the adapted program.

Preparation for future change. The student medical technologist must be prepared to conserve what is valid in scientific development and at the same time be open to change, to take full advantage of new advances once their soundness has been verified. Otherwise the technologist is already incompetent when he graduates. The real crux of mobility is teaching people to think. The curriculum should provide education, not just job training. Calvin Plimpton, M.D., President of Amherst College of Amherst, Massachusetts, stressed preparation for the future in his address at the Manpower Conference:

> "If you only train somebody, he may well be left out in the cold if you introduce new procedures and new techniques. If however, he has been educated to think, he has acquired certain patterns of thought, certain ways of establihsing qualitative judgments, and therefore has the background to live with change and himself encourage improvement."[2]

III. INSTRUCTIONAL INNOVATIONS

Educators are now aware of a rapid growth of knowledge which creates constant pressure to include more information, more skills, and more clinical experience in the medical technology curriculum. Simultaneously, there is opposite pressure to reduce the time of preparation required, or at least not to lengthen it. There is every prospect of having to teach a greater amount of information to an increasing number of students while there is the perennial shortage of faculty members to take up the task of instruction. Whether concerned with the long term implications, or the short term challenges, educators are currently concerned with a re-examination of both student and teacher in an attempt to improve the instructional process. Steps must be taken to remedy the situation by developing new approaches to the curriculum. Some alleviation

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[2] Manpower For the Medical Laboratory, op.cit., p.10.

to the immediate problem may be simply in the improvement of teaching methods. Recommendation #12 of the Manpower Conference proposed that new curriculums and teaching methods be explored, experimentation encouraged, and self-instruction utilized where it is effective, freeing the professional instructor to handle teaching situations that books and machines do not cover.[3]

Individualized instruction. A most promising development of recent years is the growing interest in the utilization of individualized instruction as one method of increasing the effectiveness of the learning experience. Independent study is now being used for students of all levels. There is little question that the intelligent use of the new media, such as audiovisual aids, television, programmed instruction, and learning resource centers, can contribute to the enrichment of the curriculum. The purposes of individualized patterns are twofold: 1) to encourage independence in learning in so far as the students take more responsibility for their education, and 2) to provide more challenging experiences by stressing broad reading and investigation, and by personal contact with teachers.

Role of the teacher. Educators admit that each class is a composite of individuality, of weakness and strength, of potential seldom realized. To the extent that we can really feed the needs, uncover the gifts, stimulate the energies, and guide the growth, can we say that we are successfully fulfilling our role as teachers. The ideal goal of individualized instruction is to teach the student to move at his own pace within his own motivational frame of reference. To achieve this aim the instructor must guide and direct the course to be followed. If basic facts are imparted in some form of self-instruction, the teacher can devote more time to clarifying the relationships between facts and developing principles that proceed from them. The instructor will have to be familiar with and capable of evaluating all of the learning resources or instructional materials designed to present the facts in his

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[3] Ibid. p.12.

discipline. Thus, with greater exploitation of books, film strips, teaching machines and other tutorial aids, students can acquire information and skills on their own. At that stage, the skilled teacher can spend his valuable time communicating attitudes rather than facts and techniques.

Role of the student. Various forms of individualized instruction provide for active involvement on the part of the student. The most effective learning situation is one in which information concerning the correctness and adequacy of the response behavior is promptly and frequently fed back to the learner. Individualized instruction is an attempt to organize instructional materials into a pattern or flow consistent with the reinforcement theory. It tends to become a learning map which permits the student to move at his own rate toward instructional goals. The integration of the student into the learning process through active response not only enhances motivation and learning but has a positive effect on retention and in his assumption of responsibility for his own learning behavior. Individualized instruction also contributes to learner achievement through its provision for directly varying the learning rate of instruction since students do differ markedly in their speed of acquiring knowledge. Where learning rate is made an integral variant in instruction, a high achievement rate can be attained by most students.

Advantages of behavioral objectives. One problem noted in the history of the curriculum is the explosion of knowledge and the resultant difficulty of identifying just what it is that we must teach the student. This problem is present to the extent that the objectives of the curriculum are stated in such general terms that both teacher and student are left confused as to the real purpose of specific instruction. Objectives for the education of a medical technologist should be set up in terms of attitudes, knowledges, understanding, skills, and other competencies which may reasonably be expected of the graduate as a person and as a professional worker. Individualized instruction

may make its most vital contribution in this area by focusing attention on the development of behavioral, measurable goals for instruction prior to the selection of any learning material intended to bring the students to these goals. The emphasis on the statement of behavioral objectives has the effect of enhancing learning simply by making the learning goals more visible to the student. The utilization of measurable goals is also significant in terms of curriculum planning inasmuch as they provide an objective baseline for evaluating the overall effectiveness of the learning experience. Evaluation is provided as an inherent part of the objectives by stating them in the form of student activities rather than as instructor achievement or content areas to be covered.

IV. STRUCTURAL RECOMMENDATIONS

The structure of the medical technology curriculum is undergoing an appraisal on a national scale at the present time. Federal funds have been provided to support and improve the education in medical technology as well as in other health fields. The Board of Schools has been asked to make the education of a medical technologist truly academic and to place "apprenticeship training" in proper perspective. A report of the National Advisory Commission on Health Manpower recommends that formal education for all health professionals should be conducted under the supervision of colleges and universities. The Commission explains that hospitals must continue to be an integral part of the educational establishment and participate in planning and teaching.

Primary responsibility for the curriculum. The evidence suggests that the gradual shift of primary responsibility for medical technology education from hospitals to colleges may be accelerated in the years ahead. Educational facilities must be better utilized with less emphasis on hospitals as teaching institutions. However, the hospitals must necessarily continue to furnish a practical laboratory setting for students who must practice new skills and learn to apply new knowledge in the

actual clinical laboratory environment in which they become meaningful. Tragic failures can result from an unfortunate lack of college-hospital cooperation in developing realistic educational experiences for those preparing for a career in the medical laboratory.

Clinical experience. The current re-evaluation is concerned with new interpretations of the term "realistic educational experience." With more and more of the basic instruction being presented by the academic institutions, it appears that the prescribed twelve-month period might be proportionately altered. If clinical work is to be part of the degree requirement, affiliated colleges and universities should more closely integrate academic study and clinical experience and should take more responsibility for the total educational experience. In past years, medical technology education has been rigidly controlled by essentials set down by the Board of Schools. It is hoped that in the near future outmoded rules will be modernized and rigid reliance on clock hours in the twelve-month clinical experience will be replaced by more effective mechanisms for developing competence.

Recommendations for the College of St. Scholastica. In keeping with the national trend in medical technology education it is recommended that the approval of the Board of Schools be requested for an experimental medical technology program at the College of St. Scholastica which would integrate academic instruction and clinical experience. Such a program would extend over a period of four academic years with a summer session following the third year. By presenting basic professional instruction in a laboratory on the college campus, the actual clinical experience could be decreased to the regular academic senior year.

An alternate recommendation would be dependent also on a modification of the essentials prescribed by the Board of Schools. This would involve the establishment of a strong four-year baccalaureate program which would include basic instruction in medical technology. Having been granted a Bachelor of Science degree the student would be qualified to receive a stipend comparable

CHAPTER V

CONCLUSIONS

In the review of the historical development of the medical technology curriculum of the College of St. Scholastica, four forces stand out as having direct influence on curricular decisions: individuals and organizations, professional agencies, educators, and students. More specifically, curricular changes have taken place through a series of small innovations which followed a re-thinking of the assumptions of the 1930's, 1940's, and 1950's. Rapid growth of knowledge and public demand for other types of instruction caused new disciplines to be introduced into the liberal arts curriculum which in turn underwent such a transformation that specialization in learning became the rule of the day. Changes that did not fit the prescription of the power structures such as the Board of Schools and the Board of Registry of the American Society of Clinical Pathologists were curtailed or modified. Some innovations which were linked to personalities were not permanent, as was observed following the death of the most forceful professional leader, Sister Alcuin Arens. Those things which have had a real relationship to the kind of curriculum that has evolved may be divided into the following areas:

1. Social factors
2. Philosophical factors
3. Psychological factors
4. The nature of science and medicine
5. Practical considerations on the quality of students, instructors, and facilities available
6. Minimum requirements established by certifying and accrediting agencies
7. Situations related to articulation between the college and the hospital

The key word in medical technology education is relevance. Those who are responsible for preparing the laboratory personnel

of tomorrow must make certain that the whole process from pre-professional preparation through graduation remains relevant. The future technologist will not be doing the routine procedures of today but rather those of a supervisory, administrative, teaching, or specialty nature.

Laboratory professionals who expect to be leaders must be ready to act, for action is the best strategy in the face of radical change. They must be ready to see that the professional curriculums are relevant to the professional world as it will be, not as it is now. They must act so that the leadership of the profession comes from within, and not be satisfied to depend on decisions of others outside the profession.

Any profession which is worth being included in the curriculum of an academic institution requires for its performance the qualities associated with a liberal mind. By clarifying the nature of these qualities through the phrasing of objectives which specify the desired changes in behavior by making these objectives explicit to students, and by developing a rich and varied set of learning experiences relevant to the accomplishment of these objectives, the College of St. Scholastica can produce graduates in medical technology who have the capability of continuing their learning and adapting to our changing society.

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APPENDIXES

APPENDIX A

MEDICAL TECHNOLOGY CURRICULUM REQUIREMENTS
(Semester Credits)

AREA	1937	1942	1947	1954	1955	1956	1963	1965	1967
Theology	4	4	8	8	8	8	15	15	12
Philosophy	4	8	8	9	9	6	9	9	8
English	8	14	14	12	12	12	12	12	-
Humanities	-	-	-	-	-	-	-	-	16
Language	6	12	12	12	12	12	-	-	-
Chemistry	30	28	28	30	28	26	25	25	25
Biological Sciences	23	21	28	28	22	22	23	23	23
Physics	8	3	-	-	-	-	8	-	-
Mathematics	6	3	-	-	6	4	6	3	4
Social Sciences	6	12	6	9	9	15	18	18	12
Physical Education	-	-	0	0	0	0	4	4	4
Clinical Experience	30	18	18	18	19	19	23	29	29
Required for Graduation	124	124	124	128	128	128	132	132	132

APPENDIX B

CURRICULUM REVISION 1968-1969

DEPARTMENT OF MEDICAL TECHNOLOGY

MAJOR REQUIREMENTS:

	Quarter Credits
CHEMISTRY:	
General Chemistry	8
Analysis	8
Organic Chemistry	10
Biochemistry	8
	34
BIOLOGY:	
General Biology	12
Anatomy and Physiology	9
General Microbiology	4
Medical Microbiology	3
	28
MEDICAL TECHNOLOGY:	
Introd. to Medical Tech.	1
Laboratory Medicine	2
Fund. of Hematology	3
Fund. of Immunology	3
Fund. of Clinical Chemistry	3
Medical Tech. Seminar	6
Applied Clinical Chem.	9
Diagnostic Microbiology	9
Clinical Hematology	6
Clinical Serology	6
Clin. & Surg. Microscopy	6
Problems in Med. Tech.	1
	55
RECOMMENDED ELECTIVES:	
Fund. of Medical Science	3
Principles of Management	3

GENERAL EDUCATION REQUIREMENTS:

	Quarter Credits
PERSON AND GOD:	
Theology of the Word	5
Theology 102	2
Theology courses(3)	9
	16
PERSON AND AESTHETIC CULTURE:	
Humanities I, II, III	13
Humanities IV	5
Humanities V	4
	22
PERSON, SELF, AND SOCIETY:	
Man and Morality	6
Metaphysics	5
Basic Ideas of Mathematics	6
General Psychology	6
Modern World History	6
Social Science	4
Physical Education	3
	36
PERSON AND COSMOS:	
(included in major requirements)	

MINIMUM CREDITS REQUIRED FOR GRADUATION - 198

APPENDIX C

MEDICAL TECHNOLOGY COURSE DESCRIPTION

1968-1969

Freshman Year:

100 Introduction to Medical Technology
Study of the development of medical technology as a profession; the role of the medical technologist as a member of the health team. 1 credit. Fall quarter.

Sophomore Year:

200 Laboratory Medicine
201 Case presentations with emphasis on the objectives, techniques involved, and significance of the various clinical laboratory tests used in the diagnosis and treatment of disease. 1 credit/quarter. Winter and Spring.

Junior Year:

300 Fundamentals of Hematology
A presentation of the morphologic and functional characteristics of the blood cells with a consideration of the abnormal mechanisms responsible for the manifestation of different diseases. 3 credits. Fall quarter.

301 Fundamentals of Immunology
A study of the principles of immunology and serology with emphasis on the properties and behavior of blood group antigens and antibodies. 3 credits. Winter quarter.

302 Fundamentals of Clinical Chemistry
A study of the biochemical aspects of disease processes and an introduction to basic principles of laboratory procedures in clinical chemistry. 3 credits. Spring.

Senior Year:

400 Medical Technology Seminar
Case study approach to the interrelationships of the basic sciences to medicine with emphasis on the significance of laboratory findings. 6 credits.

401 Applied Clinical Chemistry
Application of basic methods and techniques in the quantitative analysis of body fluids in the clinical laboratory. 9 credits. (12 weeks)

402 Diagnostic Microbiology
Experience in isolating and identifying microorganisms by cultural, morphological, and biochemical characteristics in the clinical laboratory. 9 credits. (12 weeks)

403 Clinical Hematology
Theory and clinical application of diagnostic procedures involved in the cytology of blood as found in normal and pathological conditions. 6 credits (8 weeks)

404 Clinical Serology
The clinical application of serological procedures involved in the preparation of blood for transfusions; supplemented by disease related antigen-antibody reactions. 6 credits. (8 weeks)

405 Clinical and Surgical Microscopy
Microscopic study of normal and abnormal constituents of body fluids. Differential diagnosis of disease producing parasites. Preparation of human tissue for microscopic study leading to the diagnosis of disease. 6 credits. (8 weeks)

406 Problems in Medical Technology
Advanced study and research in area of special interest. 1 credit.

APPENDIX D

MEDICAL TECHNOLOGY COURSE SEQUENCE

1968-1969

	Quarter Hours Credit		
	I.	II.	III.
Freshman Year			
Humanities I, II, III	4	4	5
Biology I, II, III	4	4	4
Chemistry I, II	4	4	
Analytical Chemistry			4
Theology	5	2	
Modern World History		3	3
Introduction to Medical Technology	1		
Physical Education			1
Sophomore Year			
Human Anatomy and Physiology	3	3	3
Analytical Chemistry II	4		
Organic Chemistry I, II		5	5
Humanities IV	5		
General Psychology I, II		3	3
Man and Morality I, II		3	3
Social Science elective	4		
Theology elective			3
Laboratory Medicine I, II		1	1
Physical Education	1	1	
Junior Year			
Biochemistry I, II	4	4	
Fundamentals of Clinical Chemistry			3
General Microbiology	4		
Fundamentals of Immunology		3	
Medical Micobiology			3
Fundamentals of Hematology	3		
Hunamities V			4
Metaphysics			5
Basic Ideas of Mathematics I, II	3	3	
Theology electives	3	3	
Medical Science		3	
Elective			2-3

Senior Year (12 months)	I-III
Medical Technology Seminar	6
Applied Clinical Chemistry	9
Diagnostic Microbiology	9
Clinical Hematology	6
Clinical Serology	6
Clinical and Surgical Microscopy	6
Organization and Management	3
Problems in Medical Technology	1