This study assesses the curriculum strategies indicated by the intellectual orientation and personality dimensions of students in a Health Technology Program at a community college. When designing curriculum, educators in allied health programs frequently overlook the characteristics of the students the program must serve. This study explores the influence of several dimensions of personality, as measured by the Omnibus Personality Inventory, and the effect these behavioral attributes might have on academic success. The Inventory Instrument uses 14 scales to measure personality and intellectual dispositions. The mean and standard deviations for each scale of the Inventory and Grade Point Average were plotted for the students, and the composite student (or mean score) was plotted on an Inventory Graph, showing the distribution of students in medical laboratory technology by types and degrees of learning orientation. The practicum presents a learning process for medical laboratory technology students based on program goals and student characteristics including a sample program for learning hematology. The author suggests that the results and the recommendations from this practicum are applicable to other associate degree health technology programs. (Author/MJK)
AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN PERSONAL DIMENSIONS AND PROGRAM SUCCESS IN MEDICAL LABORATORY TECHNOLOGY

by

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A PRACTICUM PRESENTED TO NOVA UNIVERSITY IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF EDUCATOR
NOVA UNIVERSITY
APRIL 10, 1974
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INTRODUCTION

This study examines the intellectual dispositions, personality dimensions, aspirations, family data, and grade point average of students in a community college program for one of the allied health professions, namely Medical Laboratory Technology. I hypothesize that learning is a process whereby the abilities of students become differentiated through experience which meet the needs of the student as well as the profession which they are preparing to enter.

Educators engaged in designing curricula for community college based programs of the Allied Health Professions frequently overlook the characteristics of the students these programs must serve. The goals, curricula, and instructional strategies attempt to modify the behavior of students to enable them to perform effectively in the unique clinical settings of the health professionals. Our educational efforts to achieve professional competencies are based on tasks analyses of practicing professionals, holding bachelor or higher degrees.

When the community college student encounters our instructional strategies, his behavior modification will be limited or enhanced by the nature and degree of his response. In order to develop a meaningful educational program we must discover the expectations, motivations and perceptions of our students.
I am proposing a synthesis of learning theories based on the expectation that characteristics of community college students and the professional requirements of allied health are reconcilable in the learning processes and program goals of community college programs.
BACKGROUND AND SIGNIFICANCE

It is axiomatic among learning theory psychologists that each individual engaged in classroom activities differs from every other individual so engaged in ways that are related to what he learns through these activities. Following Piaget's model, Dr. C. Kainii makes this point, "If we really want children to learn, the process of interacting with the environment must be emphasized rather than a specific response already selected by the teacher." (1)

An individual's complete personality pattern, including his cultural background, intellectual disposition, aspirations, anxieties, drives and motivational traits is neither divisible into parts nor static. Changes in individuals occur with age and with experience. The developing individual responds to multitudinous stimuli in his environment and his perceptions of the events to which he is exposed. The cognitive development, abilities, skills, interests, values, and goals a student brings to college seriously affect his opportunity to learn.

The Community College, which is alert to student choice trends and community agencies' staffing needs, invariably proliferates a growing number of programs of allied health careers. Programs for Medical Laboratory Technicians are among the health technologies which have the responsibilities for preparing competent personnel.

It is our contention that if health career programs succeed in
producing skilled paraprofessionals to fill the needs of community health agencies, we must appraise our students and modify our instructional strategies appropriately.

No single program can really represent the total spectrum of allied health, nevertheless this research and its implications for education in medical laboratory science are applicable to the major philosophic commitments of the allied health movement in community colleges. The primary role of an allied health program is to supply the manpower for one aspect of health care. Program goals must accommodate the proficiencies of the health professionals. And the practicing health professionals have defined their needs in terms of patient care, which understandably is their major concern. In designing program goals we have shown less concern for the student whom we expect to reach our goals than for the expectancies of his future employers. It is important for educators to modify program goals to meet student needs without sacrificing excellence. This can only be done by assessing the student whom the program serves and providing him the appropriate learning activities.

Usually individual program goals are based on a task analysis. This makes it imperative that we understand the task analysis is largely defined by the competencies and skills which individuals have gained from academic experience in a baccalaureate program followed by varying years of clinical experience. We could be remiss if we did not keep this fact and its importance to our educational strategies in mind.
Essentially the philosophy of allied health education requires unity, flexibility, and competency. The concept of unity is exemplified in medical technology by the career ladder approach and by articulation between all levels of educational preparation. The concept of flexibility relates the program goals to the characteristics of its students and the needs of the community agencies. The concept of competency requires a learning theory which fosters dynamic interaction between the cognitive, attitudinal, and psychomotor input and the desired professional outcomes. If students in allied health programs are to succeed, the factors that reside in the backgrounds of our students and the factors that reside in our programs must be the basis for upgrading achievement.

Certainly, the theory of learning which bridges the gap between the entering student and the graduate of an allied health program must consider the qualities health educators value. In medical laboratory science, as in other medical sciences, precision and accuracy are the hallmark of the professional. Additionally in any science, whether applied or basic, creativity is valued and must not be sacrificed. Psychomotor skills and efficiency in their use, which will transfer to new situations, are needed in mastery of the changing technological instruments which para-professionals will operate. Furthermore, judgement and evaluation are not only concepts but become tools in the activities which apply to laboratory procedures and patient care. The concept of privileged communication, which is only a small part of professional conduct, must be learned and, furthermore, valued. Patient
care as an ongoing, twenty-four hours a day, seven days a week continuum must be presented; or put another way, concern for the patient's welfare must be inculcated.

Because of the many facets of the task health educators face, a learning theory appropriate for them must focus on the technology of instructions. We require a learning theory which will apply to either simple or complex tasks, stated in behavioral terms, and which will improve the efficiency of the learning.

Health educators who work on the applied problems of teaching proficiency in a skill meeting standards of time and error are in the position of a widow responsible for a number of children. This person cannot afford to be mistress of one but must shop around for a marriage which will support her responsibilities. So it is with the health educator and learning theories. We must choose wisely the one which will answer our particular purpose. I am proposing not one particular theory but a synthesis of learning theories to develop the qualities valued by persons in health technologies.

Hilgard and Bower quote Glaser's conclusion, "What we need is an integration of a task analysis and the pertinent learning variables. Without a task analysis we will never know how to apply what we have discovered about learning."[2] The health educator must train toward objectives that are not chosen by him but are dictated by the actual demands upon the learner in terms of a task analysis. Given the task requirements of the

middle level professional and the community college student, the health educator must discover a learning situation which yields both a competent employee and a person who discovers a reason and basis for a satisfactory life style.

What support has learning theory to offer the health educator as he provides for his responsibilities? First we must differentiate between education and training. Once we isolate the highly specific skills our students need then we can devise objectives by which training will be achieved. Next we must define the objectives by which individual potential will be expressed. If we maximize individual differences through self discovery without weakening the technical content of the health technology, then we will meet student needs without sacrificing excellence.

To accomplish this our proper focus is the learner and what he can do with what he has learned. What can our student generate from what he knows? How well can he leap the barrier from learning to performing, evaluating, and continuing to learn? We begin with the community college student in the health technologies who has passed an aptitude test or failing that has succeeded in a remedial program prior to program admission. Not very surprisingly, our average student has scored close to the national mean on the fourteen scales of the Omnibus Personality Inventory. He has earned a Grade Point Average of 2.60 and if he has reached the sophomore level he plans to complete his program of studies. Our dilemma is to challenge the more able students and to reinforce and
encourage the less able. We require a view of learning and a set of learning variables related to the theory in order to do this.

**Application of Learning Theory to Health Technology**

We shall examine the various attributes and skills our students need and develop a hypothetical construct from learning theories which will serve to integrate and lend coherence to health technology instruction. What a student is asked or required to do determines what he will learn and how he will change. A curriculum rooted in learning theory will be modified to accommodate the psychological forces created by the individual's personality and the college's organization.

**Thinking Introversion.** In science, whether it be applied or basic, thinking introversion is expressed in dealing with abstract ideas and divergent information. Mastery and application of scientific concepts are important qualities to health technologists. When the inherent organization of an instructional strategy is systematically planned to offer practice in discovery, productive thinking and problem solving are facilitated.

We shall borrow from Gagne's hierarchical approach to problem solving and place our learning experiences in sequential steps. Just as it is true that complex rules depend upon prior learning of simpler rules, so also a final task of problem solving may be shown to derive facilitation from previously learned rules. "... the final task of such a hierarchy is presented with little verbal guidance and, therefore, and the character of practice..."
By designing a learning hierarchy of subordinate and supportive tasks, we encourage students to enter at the level of their competence. We do not disclose the final task to the student, but we make certain that all students perform all but the final task before attempting it. The final task of our hierarchy must have the characteristics of a problem solving activity and all students must be given an opportunity to discover the solution.

Theoretical Orientation. Theoretical orientation means an interest in or a preference for dealing with theoretical concerns and for using scientific methods. Because we accept that concepts must be extracted from experience, and because Skinner's Operant Conditioning Theory places learning under the experimenter's control, we shall advocate programmed learning to teach concepts. Programmed learning provides sequential steps which the learner masters at his own pace. Hilgard and Bower consider that the "...programmed material is better adapted to more complexly structured bodies of materials in which what is learned later depends upon what has been learned before." It has the further advantage of serving our varied student population by individualizing instruction. More importantly perhaps, sharp distinctions are necessarily distinguished as the learner connects each concept in a sequenced frame. Later, when the student works in the classroom laboratory, the concept will become operational and subsequently will transfer to a new situation through operation in that situation.


Complexity. Complexity is an intellectual disposition to value experimental and flexible ways of viewing and organizing phenomena. Probably how to make our gains cumulative for future use is one of our most difficult tasks. Flexibility and experimentation derive from insight. How may we teach insightfully? For this attribute we turn to the Cognitive-Field Theory of learning to gain our own insights into the problem. Morris L. Bigge gives us the key to our problem, "Within cognitive-field theory, learning, briefly defined, is an interactional process within which a person attains new insights or cognitive structures or changes old ones. In no sense is it a mechanistic associationistic process of connecting stimuli, which impinge upon, and responses, which are evoked or emitted, from a biological organism."[5]

Now let us examine how we may teach medical laboratory science insightfully. We must view the student as the center of our instruction. Cognitive-field theorists are concerned with outward behavior only insofar as it reveals what is transpiring psychologically or perceptually. According to cognitive-field psychologists the only reality a man can ever know, or use, is his interpretation of experience.

Bigge states, "Hence, intellectual processes are deeply affected by an individual's goals, and learning activity including habit formation, is goal directed."[6] We know our "Scam" student's goal - it is to become a practicing health technologist.

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Cognitive psychologists emphasize the person and the reality of his life space; our task is to provide experiences through which our student's interact and expand their environment. From his best interpretations of these events our student will derive insights. They will serve as dependable guides for his future.

For the health technologist instructor this means the student must have ample directed clinical experience in a real-life situation. When exposed to patients and the services of patient care, and with an everpresent instructor to explain and coordinate the instructional goals and objectives, the student will gain insights into his chosen role. Objectives for clinical experiences must provide students an opportunity to differentiate tasks, to generalize perceptions of health care, and to learn through experience what actions lead to what results. The student becomes a restructured person capable of continual differentiation, generalizations, and continual restructurization; to wit, flexible, experimental, and insightful.

Acquisition of the Skills of Health Technology. Although a skill is a motor learning task nevertheless the learning of skills corresponds in some ways to verbal learnings in that cognitive processes are heartily involved. The difference is that in learning skills we are interested in a process approach. Our problem then is learning experiences which will enable our student to bridge the gap between uncertain attempts and competent performance.
The question we must answer is how can learning theory be put to use in designing maximally effective training procedures?

The most analytical discussion of the relationship of principles of learning to an elaborate technology, applicable to health technology, has been presented by Robert M. Gagne, The American Psychologist. We have adapted his understandings of military training to develop a theory for training procedures in health technology. We propose that management of learning skills to health technologies requires these activities:

1. A task analysis must be made and elements of work identified.
2. Elements of work or tasks should be analyzed into component or microelements of work.
3. Microelements may be learned in different ways and require a variety of instructional practices.
4. The component microelements of a task must be mastered before the student proceeds to the subsequent task and attempts the final task.
5. The microelements must be placed in a hierarchy of learning tasks and must be presented as a whole to the student before he enters the hierarchical learning chain.

Acquisition of Professional Attitudes. Individuals vary in their motivation to succeed, in anxiety, need for achievement, and level of aspiration. From Green's statement, "Attitudes are associated with many of the social and cultural factors affecting personality." I theorize that ethics and professional conduct are learned through social and cultural experience.


Carl Rogers contributes our specific orientation, "Briefly it may be put that the observed phenomena of change seems most adequately explained by the hypothesis that given certain psychological conditions, the individual has the capacity to reorganize his field of perception, including the way he perceives himself, and that a concomitant or a resultant of this perceptual reorganization is an appropriate alteration of behavior."(9)

If we are to inculcate ethical behavior and professional concern we must write behavioral objectives for the desired behavior and measure change by our stated criteria.

In support of this relation of the student's self to his experience, through experience the student will be able to reorganize his perception, restructure himself and change his behavior to the appropriate professional response. Through opportunities to practice the professional role the student will identify its values and through use internalize them.

Judgement and Evaluation. It is reasonable to suggest that the sum total of the learning activities and the personality factors that influence learning themselves operate at this level.

I suggest we view learning to judge and to evaluate as a microcosm of intellectual development. It begins with instrumental activities in which procedures define concepts. These operations become internalized in a symbolic notation that remains constant in various situations and imagery. Through use and application of principles the learner gradually grasps the expected outcomes of a wide variety of procedures. Once the principles, concepts, and abstractions are mastered, the student becomes able to judge and evaluate the results of his or others' effort.\[9\]

(9) Hanuchek, op. cit. page 53.
has behavioral objectives and performance criteria from previous experiences to apply to the new situation.

The Nature of the Theory of Instruction for Health Technology. It is beyond the scope of a practicum to encompass all the aspects pertinent to learning a health technology. The major ideas are:

(1) The theory is in reality a prescription drawing on many sources for therapy.

(2) The theory is a yardstick for measuring instructional methods.

(3) The theory specifies ways for accommodating the needs of community college students and health professionals in goals.

(4) The theory encourages innovation and exploration in students, instructors, and theorists.
The Omnibus Personality Inventory and the Questionnaire were administered to sixty-nine students enrolled in the Associate Degree Program for Medical Laboratory Technicians. The results of the Intellectual Disposition Scales: Thinking Introversion, Theoretical Orientation, and Complexity were tabulated and their relation to Grade Point Average investigated. The study was designed to assess the relative heterogeneity of certain personality measures and personal data among the successful students majoring in medical laboratory science.
RESULTS

The raw scores on the various scales of the OPI, which was administered to sixty-nine students in medical laboratory science, varied widely. This wide distribution of scores and the students cumulative grade point average appear in Table I. We shall restrict our examination to the relation of three intellectual disposition scales and academic success; although Estheticism is listed as one of the Intellectual Dispositions it is not prerequisite to an applied science. Our primary interest focuses on Thinking Introversion (TI), Theoretical Orientation (TO), and Complexity (CO) because of their importance to the application of learning theory to health technology.

The mean score of our student population on the OPI scales rather closely parallels the mean of the normative sample. The lower score on the Masculine-Feminine Scale possibly reflects the high number of women in the program. From the mean score on the OPI scales and the cumulative grade point average which are plotted in Figure 1, we see our student population is fairly typical of community college students.

From the Office of Institutional Research we learned that the mean Grade Point Average for all degree students at Florida Junior College is 2.48. The mean Grade Point Average for students in the Medical Laboratory Technicians Program is 2.66, which is 0.18 points above the average.

Of the study group thirty percent have withdrawn from the program, twenty one percent either have or will graduate by the end of the school year, and forty-nine percent indicate they expect to complete the program of studies. All of the students who scored above the mean on Complexity or autonomy have continued in the program. Table II
None of the women students who are married have withdrawn from the program and only two of the married men have withdrawn.

Forty-eight percent of the students responded positively to the questionnaire item relating to aspiration to a Bachelor's Degree; however in a recent follow-up of the program graduates, we find only approximately fifteen percent of the students so engaged.

Sixty-five percent of the study group is under twenty-one years of age and seventy-two percent of the study group selected their present years as their happiest. One might interpret this choice as indicating that the success the students are experiencing in school is reflected in their general attitudes. Whatever interpretation is placed on the data, they do indicate a striking homogeneity.

Of particular significance to the application of learning theory to instructional strategy is the data comparing grade point average to the T.I. and T.O. scales of the OP!. Nine out of eleven students who were below the mean on these two scales and who failed to maintain a grade point average above 2.50 have withdrawn from the program. Table III

Personal dimensions, which appear to relate to a preference for intellectual activity by students in a health technology program, have been reported. Our challenge then is to examine learning theory for its relevance in planning instruction which will enable community college students to function professionally as they move from program to careers.

Conclusions

Our hypothesis that a certain intellectual disposition including a preference for Thinking Introversion, Theoretical Orientation and Flexibility was affirmed in our study. This is particularly significant to
the following two reasons:

(1) In view of a selective admission policy which placed emphasis on academic aptitude scores in evaluating program applicants, it appears a personality inventory would provide additional relevant information to aid in counseling students.

(2) Learning theory can be applied to planning levels of learning and levels of testing for the type of mental processes the student needs to develop.
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CLASS MEAN: 25 19 12 15 23 11.2 23 26 30 12.3 21 15 28 13.5 2.66
### Table II.

**SUMMARY OF DATA OBTAINED ON INTELLECTUAL DISPOSITION SCALES AND CUMULATIVE GRADE POINT AVERAGE**

(Students who have continued in the Program)

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<thead>
<tr>
<th></th>
<th>Mean</th>
<th>% of Students Above Mean</th>
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<tr>
<td>Cumulative Grade Point Average</td>
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<td>Thinking Intraversion Class Mean</td>
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<tr>
<td>Theoretical Orientation Class Mean</td>
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<tr>
<td>Complexity Class Mean</td>
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### Table III.

**STUDENTS WHO HAVE WITHDRAWN INTELLECTUAL DISPOSITION SUBSCORES AND GRADE POINT AVERAGE**

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<td>Average age</td>
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<td>Number over 21</td>
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<tr>
<td>Percent male</td>
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<td>Percent married</td>
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<td>Plan to work as MLT</td>
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<td>Aspire to a Bachelor's Degree</td>
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<td>Consider their present age happiest</td>
<td>72%</td>
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<tr>
<td>Are gainfully employed 10 hours or more per week</td>
<td>45%</td>
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<td>Withdrawals by midterm of Term II</td>
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<td>Graduates</td>
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<td>School year 1973-74</td>
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RECOMMENDATIONS

The particular data presented appear relevant to the intellectual disposition categories. Although restricted to students in medical laboratory science, the data are consistent and supportive of the hypothesis underlying this systematic attempt at revealing a correlation between personality profiles and dropout propensity. Therefore we recommend that:

1) Every student enrolled in a health technology program take a Personality Inventory.

2) The results of this inventory and its professional interpretation be available to him, and his Program Director, through the Office of Student Services.

3) Teaching procedures in health technologies be systematically developed and evaluated for a level of teaching and learning which encourage problem solving, reflection, concept and principle exploration, purposeful involvement, and cooperative inquiry.

The appendix contains examples of learning experiences which relate to learning theory and a particular intellectual disposition based upon this third recommendation.
BIBLIOGRAPHY


Use the technique to process clinical samples for serum glucose

Prepare standard curve for procedure

Transfer verbal statements of the relationship between concentration and absorbance to clinical procedures

Use a spectrophotometer to assay serum glucose

Practice operating the spectrophotometer

Prepare reagents and standards for the technique

Select a technique for spectrophotometric assay

Recall the normal values and the techniques for glucose determinations

Use Beer's Law to express the relationship between a standard and unknown solution

Memorize Beer's Law and state its relation to spectrophotometry

Watch sound and slide principles presentation of spectrophotometry

A LEARNING HIERARCHY PERTAINING TO SPECTROPHOTOMETRY

SHOWING

REQUISITE, VERBAL, AND SEQUENTIAL SKILLS

BEST COPY AVAILABLE
A PROGRAM FOR LEARNING HEMATOLOGY

The Learner's Manual
Basic Concepts in Hematology

By Laura A. Wiesenfeld
PREFACE

IN THIS PROGRAMMED COURSE OF INSTRUCTION YOU WILL STUDY THE BASIC HEMATOLOGY PRECURSORS FOR A FIRST COURSE IN CLINICAL HEMATOLOGY. CLINICAL HEMATOLOGY COMPRISIRES THE INFORMATION OBTAINED FROM THE DIAGNOSTIC LABORATORY PROCEDURES INVOLVING THE EXAMINATION OF PERIPHERAL BLOOD, VENOUS BLOOD, AND BONE MARROW ASPIRATIONS. MORPHOLOGIC AND PHYSIOLOGIC DATA, DERIVED FROM HEMATOLOGIC TECHNIQUES, ARE NEEDED TO COMPLETE THE CLINICAL STUDY OF PATIENTS AND TO ASSIST THE PHYSICIAN IN THE DIAGNOSIS OF DISEASE. IF THESE RATHER FAMILIAROUS NEW TERMS ARE FRIGHTENING THEN THIS BOOK IS FOR YOU BECAUSE IT IS DESIGNED FOR YOU, THE LEARNER.

ALTHOUGH MEDICAL LABORATORY PERSONNEL OFTEN LEARN USEFUL HEMATOLOGICAL PROCEDURES, THEIR PERFORMANCE OF THE MEDICAL TECHNIQUES OF HEMATOLOGY INVESTIGATIONS IS NOT TO BE CONFUSED WITH ACTUAL KNOWLEDGE OF HEMATOLOGY. FOR THAT REASON THESE EXERCISES IN HEMATOLOGY ARE DESIGNED TO HELP YOU ACHIEVE THE FOLLOWING GOALS:

(1) YOU WILL UNDERSTAND THE BASICALLY FUNDAMENTAL OR SUPPLEMENTAL KNOWLEDGE FOR THE SUCCESSFUL PRACTICE OF CLINICAL HEMATOLOGICAL TECHNIQUES.
(2) YOU WILL ACQUIRE A FRAMEWORK FOR THE MORPHOLOGICAL DIFFERENTIATION OF BLOOD AND BONE MARROW CELLS.
(3) YOU WILL ACQUIRE THE NECESSARY HEMATOLOGIC PRINCIPLES AND FOUNDATION MATERIAL TO INCREASE YOUR KNOWLEDGE OF THE QUALITATIVE AND QUANTITATIVE PROCESSES FORMING THE BASIS OF HEMATOLOGICAL DIAGNOSIS.
Guidepost: Briefly stated, Hematology is the study of blood and its formed elements. Many of the young blood cells normally exist only in the bone marrow and appear in the peripheral blood only in disease.

Blood is man's only fluid tissue.

Unit I - Hematology is the sum total of the techniques and the information derived from these hematological studies as they are used in patient care.

Key Words:

Bone marrow  
Lymph  
fetal  
 hematopoiesis  
nucleated  
disc  
cubic millimeter  
coagulation  
platelets  
hematological  
hemoglobin  
leukocytes  
cyte  
cytopenia  
oxygen  
carbon dioxide  
erythrocyte  
plasma  
phagocytosis  
thrombocyte
This module is written with you in mind and is the learner's manual; that is, finishing the learning experiences provided in this unit you will be able to:

1. Define hematology and use the key words correctly, using the text as your reference.

2. List the formed elements of blood and classify them in three major divisions based on morphology and function with 100% accuracy.

3. State the size and function of erythrocytes according to the information in section eleven.

4. State the size and function of leukocytes according to the information in section twelve.

5. Classify leukocytes into three classes with 100% accuracy.

6. State the size and function of platelets according to the information in section fourteen.

7. Recognize the overall criteria for neutrophilic maturation with 80% accuracy.

8. Apply these criteria to other cells of the leukocytic series with 100% accuracy.

9. Recognize that the laboratory technician's work reflects the patient's health and requires careful responsible work.

10. State the distinguishing morphology and the unique role of blood platelets using the information in this unit as your reference.

When you come to a blank space try to fill it in without checking the answer first.

The complete clinical study of any patient requires diagnostic laboratory procedures involving ________________________________

Blood

Frame 1
The word hematology is derived from the Greek word alma (blood) and logos (science), literally translated, "the study of blood." A hematologist is one who specialized in the study of blood.

Blood itself is a red fluid of variable composition circulating through the blood vessels of the body. It participates in the physiologic activities of all the body cells.

Blood is composed of a liquid called plasma in which the cellular elements are suspended.

Because hematology concerns the sum of the blood cells produced, the blood cells released into the peripheral circulation, and the blood cells that survive, the abnormalities found in cells of the peripheral blood reflect an imbalance between cell production, cell release, and cell survival.

The hematopoietic system comprises that organ complex associated with the morphologic elements of the blood and the manner and loci of their formation and function.
Hemopoiesis (aima + poiein) derives from the Greek words meaning blood and to form. A synonym for hemopoiesis is hematopoiesis.

The vascular system comprises the arrangement of vessels circulating all the body (a)_____ including the heart, (b)______, capillaries, veins and lymphatics.

(a) fluids (b) arteries

The study of hematology deals with the morphologic elements, sometimes called formed elements or (a)_______ components, and the fluid in which they are (b)______.

(a) cytological (b) suspended

If we withdraw blood from the vascular system and prevent clotting the hemocytes (also known as the)_______ _____ of the blood can be separated from the plasma.

formed elements

From section #10 we learn that blood which contains an anticoagulant can be separated into formed elements and (a)_______. Blood contains fibrinogen and other coagulation factors which form a fibrin clot at the site of an injury to a blood vessel. Serum contains no fibrinogen. It is removed as insoluble fibrin threads in which the (b)______ _____ are meshed.

(a) plasma (b) Blood cells
Human blood cells may be classified into three major divisions based on morphology and function. They are erythrocytes (a) _______ leukocytes (b) _______ and thrombocytes (platelets).

(a) red blood cells (b) white blood cells Frame 12

Any variation in the number, shape, and function of one or more of these cell series of the (a) _______ will produce and (b) _______ symptom complex called a blood dyscrasia.

(a) blood (b) hematological Frame 13

The erythrocyte is an elastic biconcave disc lacking a nucleus and measuring 7.2 micra in diameter. It has an average life span of 120 days. Erythrocyte carry hemoglobin as a respiratory pigment in the form of oxyhemoglobin. The main function of erythrocytes is to transport hemoglobin with its associated oxygen and (a) _______ dioxide.

(a) carbon Frame 14

Unstained erythrocytes are a pale greenish yellow due to the presence of (a) _______. Erythrocytes stain (b) _______ with Wright's or Romanowsky stain.

(a) hemoglobin (b) eosin Red Frame 15
The leukocyte or (a) _______ _______ is a living nucleated cell 8-12 in diameter. It's life span varies. It occurs in both peripheral blood and (b) _______ _______. In peripheral blood leukocytes are composed of polymorphonuclear cells, lymphocytes, monocytes, and plasma cells.

(a) white blood cells (b) bone marrow  

The life span of our first lines of defense or the polymorphonuclear cells is three to four days, of lymphocytes is approximately one hundred days, and of monocytes two days to two weeks. The life span of _______ cells is of unknown durations.

plasma  

Leukocytes are identified by certain nuclear and cytoplasmic morphology and (a) _______ characteristics, when the Romanowsky stains are used. Each series of (b) _______ fulfills a protective role in defending the body against (c) _______, by (d) _______ and/or pinocytosis and immune antibody formation.

(a) staining (b) leukocytes (c) disease (d) phagocytosis

The thrombocyte (G. thrombos, a clot, + kytos, cell) or a _______ is a morphologically irregular, thin, discoid cell, round or oval in outline, with a smooth, well defined limiting membrane. Platelets vary from 2 to 4 micra in (b) _______ and are derived from the cytoplasmic portion of megakaryocytes, the (c) _______ cell.
Megakaryocytes are the (a) ____ cells of the bone marrow. The thrombocyte stains purple red with the (b) ____ stain. The thrombocyte is the most fundamental factor in (c) ____ inasmuch as it appears to function in all the known mechanisms utilized by the body to control the loss of (d) ____.

(a) giant (b) Romanowsky (c) hemostasis (d) blood

Hematological examinations require a properly collected blood (a) ____. If the laboratorian understands that blood is the only fluid tissue, he will perform (b) ____ techniques carefully and accurately to insure that this (c) ____ tissue biopsy accurately reflects the patient's state of (d) ____.

(a) sample (b) hematological (c) fluid (d) health

Summary: You have completed your first unit, congratulations. If you wish to reinforce your knowledge review the objectives. In this way you will know you have learned the material in this unit. Did you? Proceed.
A Criterion Referenced Evaluation to Measure Mastery of the Complexities of the Clinical Situation

1. A physician has ordered a stat urinalysis on Fu Wong. He requests you to do it without first logging in the specimen because he must leave for a meeting:
   (a) you comply
   (b) you do not comply but you log in, explain why, and do the stat immediately
   (c) you comply but answer a call in the E. R. first
   (d) you do not comply and do the stat in order of its arrival

2. The first morning specimen of urine is requested often because:
   (a) the patient rested all night
   (b) the urine remained in the bladder for a longer time
   (c) the urine is more concentrated
   (d) this specimen is easier to collect

3. Which of the descriptions best fits the following crystals:
   a. Calcium Oxalate
   b. Uric Acid
   c. Triple phosphate
   d. Calcium carbonate

   1. Prisms and "coffin lids"
   2. Many forms-colored plates, prisms, hexagons, etc.
   3. Colorless, octahedral squares with double diagonal lines
   4. Dumbbell or spherical forms

4. If urine specific gravity reads above 1.026 on the T. S. meter you should:
   (a) ask for another specimen
   (b) report it above 1.026
   (c) report it as 1.026
   (d) dilute it 1-1 with distilled water and double the last two figures

5. Combistix may become unreliable if they are:
   (a) not used immediately
   (b) subjected to cold
   (c) allowed to absorb moisture
   (d) not used at room temperature
LEARNING HIERARCHY FOR ACQUISITION OF A SKILL
TRAINING AND PROCEDURE

- Seal blue tip end with sealing wax
- Use downward motion to remove excess blood from outside of tube
- Tilt capillary tube so both ends are free of blood
- Fill capillary tube 2/3 full with blood sample
- Remove stopper from sample cleanly
- Mix blood sample by slowly inverting 10 times
- Select proper capillary tube
- Calculate results to correct value (+2%)
- Measure red cell and plasma volume
- Remove sample without breaking or mixing contents
- Allow head to come to full stop
- Manipulate timer to 5 minute interval
- Replace cover, close and lock lid
- Position capillary tube correctly
- Examine rubber liner
- Check centrifuge suction to bench top
- Complete task within time limit set by instructor
FLOW CHART TO BE USED IN IDENTIFYING AN UNKNOWN BACTERIUM

ORDER: _____________________
FAMILY: ____________
GENUS: ________________
SPECIES: ________________

1. MORPHOLOGY
2. GRAM STAIN
3. FLAGELLA
4. SPORES
5. O2 REQUIREMENT
6. MEDIA
   a. ____________________
   b. ____________________
   c. ____________________
   d. ____________________
   e. ____________________
   f. ____________________
7. COLONIAL CHARACTERISTIC
8. CARBOHYDRATES
   a. ____________________
   b. ____________________
   c. ____________________
   d. ____________________
   e. ____________________
9. BIOCHEMICAL TESTS
   a. ____________________
   b. ____________________
   c. ____________________
   d. ____________________
   e. ____________________
   f. ____________________
   g. ____________________
   h. ____________________
   i. ____________________
10. ANTIBIOTICS
    susceptible to: ____________________
    resistant to: ____________________
11. AG/AB TESTS
12. DISEASES PRODUCED BY: ____________________
13. NORMALLY FOUND: ____________________

This exercise is used to develop judgment in evaluation.
QUESTIONNAIRE PERSONAL DATA

1. Name__________________________________________

2. Student Number__________________________

3. Date________________________________________

4. Birth Date__________________________
   Month   Day   Year

5. Male______ Female________


7. Have you attended another college:  Yes______ No______

8. Is this your 1st_____ 2nd____ 3rd____ 4th____ 6th____ term at FJC

9. Check one:  Out of school employment

   (1) _______ None
   (2) _______ 1-10 hours
   (3) _____ 11-19 hours
   (4) _______ 20-29 hours
   (5) _______ 30-39 hours
   (6) _______ 40 hours or more

10. Five years from now I would like to be:

    (1) _______ a student
    (2) _______ a medical laboratory technician
    (3) _______ married and raising a family
    (4) _______ a medical technologist with a Bachelor's degree
    (5) _______ in any field which can utilize the skills of the medical lab-
    (6) _______ in any field in which I can earn the most money
    (7) _______ don't know

11. Marital status _______ single _______ married
12. I consider the following to be the happiest years of one's life. Check one.

(1) 1-4  (6) 30-39
(2) 5-9  (7) 40-49
(3) 10-14 (8) 50-59
(4) 15-19 (9) 60 or 60 plus
(5) 20-29

13. Pick the grade closest to your high school average.

(1) _____ D  (2) _____ C  (3) _____ B  (4) _____ A

14. What is your cumulative grade point average?

(1) _____ 1.5  (2) _____ 2.0  (3) _____ 2.5  (4) _____ 3.0
(5) _____ 3.5  (6) _____ 4.0

15. Were you born in Florida? Yes_____ No_______

16. How many years have you lived in Duval or Nassau counties? _________

17. How many different schools did you attend before the 10th grade? _________

18. How many different schools did you attend from grades 10 to 12? _________

FAMILY DATA

19. (1) Living at home
(2) Living away from home
(3) Deceased

20. Occupation of Parent
(1) Professional
(2) Semiprofessional
(3) Skilled
(4) Semiskilled
(5) Unskilled
(6) Retired

Father  Mother
21. Educational Level of Parent
   (1) Did not complete high school
   (2) High school graduate
   (3) Some college
   (4) College graduate
   (5) Post-graduate work in college
   (6) Don't know

   Father
   __________

   Mother
   __________

22. Brothers ______, Sisters ______ number of each

23. Check the appropriate box, are you the
   eldest ______ about middle ______ youngest ______?

24. I live with: (1) one or both parents ______ (2) husband or wife ______
   (3) friend or friends ______ (4) grandparents ______ (5) alone ______

25. If married - do you have children? boys ______ girls ______
   Ages of children ________________________________

________________________________________________________________________