Alberta for their cooperation in filling out the questionnaires. A larger per cent (78) came in than is usually the case when such reports are made. He regrets that he has been deprived of the opportunity of working with the teachers of the secondary schools of Alberta for the benefit of the coming generation and of the opportunity to personally help in the improvement of the course known as "Physics one" for the freshmen in arts and sciences at the University of Alberta by circumstances taking him to another field.

SOCIOLOGICAL ASPECT OF CHEMISTRY FOR GIRLS.

BY WILL COURSON,
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The beginnings of physical science are to be found in the slow and unconscious observation of primitive races of man. Earliest mankind acquired mastery over rude implements, by the aid of which they strove to increase the security and comfort of their lives. Biological science must have begun with the observation of plants and animals useful to man. Astronomy was investigated because it was of necessity in the worship of gods. Practical medicine became of much consequence because it administered to the material needs of man. In ancient times, when knowledge of nature was small, little attempt was made to divide science into parts, and the men of science did not specialize. Aristotle was a master of all science known in his day and wrote treatises on physics and animals. An increasing knowledge made it impossible for any one man to grasp all scientific subjects, hence it became necessary to establish lines of division for convenience of study and teaching. When the study of science was admitted to the American school it was under the name of philosophy. This included in a single course the explanation of a very wide range of phenomena belonging to the several sciences of our present day reckoning. In the differentiation which followed upon the expansion of the science curriculum, this original generalized course was split into several sciences. Each has been organized into its own field without reference to the other. In a later consideration we find the colleges and universities have taken up specialized ideas of research and have thrown back into the high school the work that was formerly done in and by the colleges and universities. To some measure at least the college has become a dictator to the high school teacher who, if he is a college trained man, easily

falls in line with the subject matter offered and suggested by the college. However, if education is to form useful and specific habits and is to give useful information, it is necessary to study the sociological needs of the situation. It is not necessary, in fact it may not be wise, for a farmer to study chemistry of metallurgy or that of pharmacy. Smith says science should be taught with three motives in mind: first, the development of taste and power of appreciation; second, the acquisition of facility in the use of facts, ideas, and methodical thought processes; third, the development of scientific insights, perspectives and altitudes of mind that serve as safeguards of a well balanced training. The general aim of education from the modern vocational and sociological standpoint is to develop in the individual the highest type of personality combined with economic and social efficiency. Modern educators are returning to the old Greek idea that health is the first and most important of educational aims and any subject that neglects an opportunity to improve the community ideals along the course of sanitation and clean living has missed its highest purpose.

The early secondary schools contained only boys, and the girls were not even permitted to attend. Only the selected few of the boys were favored with the advantage. The free secondary school in our country has practically eliminated the academy and preparatory schools. Not only has our free public school attempted the college preparation and the cultural development but it has broadened itself to include training in the trades and vocations of the ordinary walks of life. Recent strides in the nation and in our own state have left educators who clamored for the highly specialized training of the leaders of society clinging to the skeleton of a fad that seems at present doomed to ultimate destruction. Yet in the present trying times of war and destruction it is more necessary than ever before that we have highly trained and efficient leaders, likewise it is as essential that the followers be trained and do their bit toward humanity's progress with the same pride and satisfaction as those who occupy the higher positions among men. If we maintain our ideals of democracy it is necessary that all have training and preparation for fitness in some small yet important place in the machinery of the community.

The attendance in the secondary schools has changed from the entire absence of girls to the position in which girls are in the majority in most high schools. Dr. Lewis finds from statistics

that about 76 per cent of the girls that enter high school are married before twenty-five years of age, also more than 95 per cent of girls that enter high school never attend college. These statistics emphasize the important responsibility thrust upon the high school. The high increase in per cent of attendance has called for changes in the curriculum. The public demands that the schools fit the pupils to take an efficient position in the social life of the community, and all should be at least exposed to an opportunity to become useful and important members of society. Eminent educators have practically agreed that the highest training that can be given girls is that which pertains to home life. Since the masses as well as the classes are to be trained, it is at least our concern to ascertain if we are giving the girls in high school chemistry and physics the subject matter that will function in their future lives.

It is impossible to know exactly what facts will be most essential in each individual student's life, but each girl that becomes a mistress of a home meets daily problems that she must solve. The responsibility of the welfare of the home should and does rest to a great extent upon this one individual. Food, clothing and shelter afford many important problems in the life of the home maker. Problems of sanitation and cleanliness confront each housewife. Around important problems many topics may be selected that are of real interest to the average girl. The topic method requires much effort on the part of the teacher, because much work is necessary to organize the material. However, the girls become more interested if real and live home problems are considered. The topic or problematic method consists in dealing with a situation as a whole, yet the method may be deductive.

"How to make good bread" is a problem that confronts each and every householder and great opportunity is afforded to apply important scientific facts and principles during the process of the discussion of the different manipulations of bread making. The idea of luck in bread making may be eliminated and in place of the almost superstitious ideas now current, satisfactory scientific answers are given to the mystifying questions. Scientific facts are eagerly learned when a definite need is felt by the individual. The subject of leavening may be easier and better taught if the pupil is led to see some practical use for the principles and facts of leavening than if the subject was separated from the vital phase of household affairs.

The problematic method affords an opportunity to utilize the motor power of the feelings. Horn says that "no idea which the feelings fail to welcome can abide in the home of the mind." Personally, I have often felt that my attempt at teaching has been a failure because the pupil has not felt, to any considerable depth, the reason, purpose or meaning of the subject matter. The material offered did not seem to function in his or her development.

The topic or problematic method affords splendid opportunity for a socialized procedure. Pupils as a rule pay more attention and manifest more interest in a discussion from a member of the class than if the same material be given by the teacher.

An opportunity for directing work, conducting drills and reviews is offered by socialized procedure. It vitalizes and adds to the interest of the work. High school people enjoy being "it" the same as the rest of us. Better preparation with less effort is quite possible but requires more effort on the part of the teacher. Many science teachers conceive the idea that if proper principles are taught and emphasized, the fact material makes little difference. The question the writer wishes to raise is: which is more important to the life of the average person, principles or facts? Facts are the fundamental basis of all our constructive thinking. Often the student is misinformed because of failure to understand the intention of the principle. The students that enter college should have the fundamentals so that a basis upon which to build may be established in the high school, but those going directly into open life need material that is unified within itself. The tasks of the average girl are in connection with home life and those of the boy are in the factory or in business life. Do boys and girls need the same science training? This is an open question. Each community differs to some extent from every other community. It is also an open question if each community can be best taken care of with the same subject matter.

It was predicted in a class in Columbia University that the science given in the high school of the future would be based upon the individual need of the community. Instead of one year of chemistry or one year of physics the time would be spent in solving the problems presented regardless of their place in the different science subjects. I was as much shocked almost as if some one five years ago would have predicted the present world war.

However, what the average woman needs in connection with home duties is not the ability to recite Boyle's or Charles' Laws or Thompson's rule, but rather the knowledge of useful facts and the application of principles that function in daily life in an economic, social or hygienic manner. She needs such facts as will help her meet the emergencies in the solution of problems in home life.

WHAT IS PRACTICAL MATHEMATICS?

By DAVID H. MOSKOWITZ,

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Almost from the day of its inception—if such a day may be regarded as having been existent—the science of mathematics and its schools of devotees had separated into contending factions—the real and the ideal. The branch denoted “real” or practical was possibly the more primitive. However, the “ideal,” or conceptual branch entered early in the form of mysticism! Among the Greeks, while Euclid insisted most strenuously upon the pursuit of the “ideal,” Heron was equally partisan for the “real.” At a later period, when the progress of mathematics had influenced the course of civilization to a very marked degree, mathematicians of note devoted their energies equally to both branches, thereby reconciling rather than deepening the conflict between the factions.

And yet, today we are overburdened with the cry for the practical—the vocationalizing of all studies, mathematics included. Everything is scrutinized for its “bread and butter” value—witness the Perry movement in England, and the influence of the Rockefeller foundation in the United States.

Let us glance cursorily into the history of thought to determine the changes in the appreciation of mathematics as a factor in the evolution of our civilized world. To the people of his time, 550 B. C., Pythagoras and his followers were no more than impractical mystics performing “gymnastic exercises in logic,” so much so that the school aroused intense political enmity resulting in its banishment and ultimate dissolution.

Euclid (300 B. C.) was regarded in the same light by the Alexandrians; Pope Sylvester 11 (1000 A. D.) was called a magician; Roger Bacon (1250) met with a worse fate than Socrates—the martyrdom of enforced silence; Galileo and Bruno, and a score of others, attest to the lack of appreciation that was bestowed upon mathematics and its allied sciences.