course and enumerated 12 common specific evils on which men often ponder in themselves and ultimately do. "All these evil things come from within, and defile men," concluded the Teacher of teachers.

One principle I should like to pass on to fellow teachers" is teach as you live. Emerson, one of the most beloved of American philosophers, made a remarkable statement to that effect when he said, "What you are speaks so loud that what you say can't be heard." And again the Golden Rule[4-d] when reduced to its lowest term as the give-and-take way of life, would make a safe rule of conduct if we stick to the order enunciated, viz, first give, then take; never reverse the order. In other words, Be whatever you desire to impart to the children and the result shall follow. Slowly, perhaps, but surely! All our teachings are as writings on water if these are not flesh-and-blood in us, first of all. "Teachers and educators have the right to be treated as persons of dignity and worth—and the corresponding duty to treat their co-workers and their pupils in the same manner." This *corresponding duty* should be first expected from us, "fellow-teachers," before we "have the right to be treated as persons of dignity and worth."[12]

Would you like to have your name written forever in the hearts of men? Then, govern your temper, tongue, and conduct. Your personality shall continue for eternity in the lives of your children in spite of your attainment, position, and remuneration.

12 Art. VII, a CHARACTER FOR EDUCATORS AND EDUCATIONAL PROFESSION.

The Teaching of Optional Physics

By Jack Smith

PHYSICS, as a school subject, has been dreaded by most students. In some secondary schools, the subject is offered as "optional," perhaps, to attract the students, especially those who are interested in the study of science but could not tackle the mathematical side of the subject. At any rate, the contents of Physics are taught similarly to students taking the subject as an optional or regular course. While this practice is wholesome, yet much disappointment and discouragement has been felt by the students taking the subject as an optional course. Something should be done to evolve a certain course of study of Physics as an optional subject or a subject fit for students of low intelligence, without defeating the purposes and objectives of the course. The idea is to make a modification of the course of studying to fit a particular kind of students to it.

The writer, for this reason, is suggesting the inclusion of but three study units in Physics as an optional course or as a course for those desiring to take it but has a low intelligence to pursue it as offered in the regular curriculum. These units are: (1) Mechanics and Sound, (2) Heat and Light, and (3) Magnetism and Electricity. The following are the breakdown of the details for each unit:

(1) Mechanics and Sound

a. Rectilinear motion: velocity and acceleration, uniform acceleration, simple problems on the variation of displacement and velocity with time. The relation between force, mass and acceleration with simple problems. The determination of **g** by a simple method. Vector and scalar quantities; parallelogram (triangle) of displacements, velocities and forces. The resolution of a force into components at right angles. Moments. Center of gravity and its experimental determination.

b. Work, energy and power; the conservation of energy; simple problems involving the units erg, joule, watt, foot-pound weight and horsepower. Simple machines: levers, the common balance, the inclined plane, the single pulley, the block and tackle, the hydraulic press, the wheel and axle, the gear wheel, the screw. Mechanical advantage, velocity ratio and efficiency. Qualitative ideas on friction.

c. General differences between solids, liquids and gases. Elementary ideas of the kinetic theory of matter. Density; relative density (specific gravity); principle of Archimedes and flotation; the common hydrometer. Pressure in fluids; barometers (excluding

Fortin pattern), siphon; lift pump, force pump, Boyle's law. Simple forms of air pump (compression and exhaust).

d. Elementary treatment of wave motion; the relation between velocity, frequency and wavelength. The production and propagation of sound. The physical factors which determine the loudness, pitch and quality of sounds. Experimental determination of the velocity of sound in air; its variation with temperature. Reflection of sound, echoes. Determination of the frequency of a tuning fork by any one method. Factors which affect the frequency of the note from a vibrating string and from a vibrating air column. Resonance. Beats.

(2) Heat and Light

(a) Temperature; the liquid-in-glass thermometer, Centigrade and Fahrenheit temperature scales and their conversion, determination of fixed points. Maximum and minimum thermometers.

(b) Elementary calorimetry, determination of the specific heat of solids and liquids (excluding the method of cooling). Meaning of calorific values of fuels and foodstuffs. Expansion of solids, liquids and gases. Coefficients of linear and volume expansion, coefficients of real and apparent expansion. The relations between pressure, volume and temperature of a gas, treated quantitatively. The gas equation PV/T equals constant. The idea of the absolute zero of temperature.

(c) Change of state: volume changes which accompany it (only a qualitative study in the case of evaporation). Latent heats of fusion and evaporation. Vapors and vapor pressure. Effects of pressure and dissolved substances on the boiling points of liquids and on the melting point of ice; regelation. Cooling by evaporation; simple refrigerator circuit of the volatile liquid type. Moisture in the atmosphere, relative humidity, dew point; a study of the Regnault type hydrometer; the principle of the wet and dry bulb hygrometer.

(d) The processes of conduction and convection; examples of their practical application. Approximate comparison of thermal conductivities.

(e) The mechanical equivalent of heat and its experimental determination by a simple mechanical method. Heat as a form of energy. Simple treatment of steam engines and internal combustion engines. Radiant energy; the relative emission and absorption of such radiation by different surfaces.

(f) Propagation of light in straight lines, shadows. Eclipses of sun and moon. Pin-hole camera.

(g) Photometry. The standard of luminous intensity. Illumination (normal incidence only); the law of inverse squares; the foot-candle; comparison of candle powers by a simple method; a simple light-meter for measuring illumination.

(h) Reflection from plane surfaces; laws of reflection; construction of path of reflected ray; rotation of plane mirror; reflection by two parallel plane mirrors and by two plane mirrors at right angles. Reflection by concave and convex spherical mirrors; principal focus and focal length; formation of real and virtual images; determination of the focal length of a concave mirror; magnification.

(i) Refraction; laws of refraction; refractive index and its determination by simple methods (critical angle methods not expected); real and apparent depth; total internal reflection, critical angle, use of right angle prism. Refraction by a prism, deviation. Thin converging and diverging lenses; principal foci and focal length; formation of real and virtual images; magnification; determination of focal length; formation of real and virtual images; magnification; determination of focal length of converging lens by conjugate points and by use of plane mirror. The eye as a simple optical instrument; long and short sight and their correction by means of spectacles (numerical problems need not be given). Simple camera, magnifying glass, projection lantern. The elements of the structures of the compound microscope and refracting telescopes, excluding numerical calculations and ray diagrams. (Numerical examples on both mirrors and lenses may be solved either by the graphical method or by use of the formula involving **u**, v and **f** using any consistent sign convention.)

(j) Dispersion; simple experiments on the analysis and the recombination of white light. Formation of a pure spectrum (spectrometer not expected). Color; color absorption; addition and subtraction of colored lights and pigments, treated simply. Descriptive study of the electro-magnetic spectrum including radio-frequency, infra-red and ultra-violet radiations, X-rays and gamma rays.

(3) Magnetism and Electricity

(a) Simple phenomena of magnetism, experiments on magnetic induction; methods of magnetization; laws of magnetic force, unit pole, magnetic field strength, comparison of field strengths with the deflection magnetometer; representation of magnetic fields by lines of force, fundamental ideas of the earth's magnetic field.

(b) Simple phenomena of electrostatics; electrification by friction, positive and negative charges, conduction, induction, gold leaf electroscope, distribution of charge, discharging action of points; electrophorus, one type of influence machine. Unit charge, strength of electric field, potential, electrostatic field and its representation by lines of force, capacity, con-

densers, effect of dielectric. (Numerical problems involving an application of the law of inverse squares need not be set.)

(c) The electric current: demonstration of its existence by its chemical, magnetic and thermal effects: the simple voltaic cell and its defects; Leclanche cell, dry cell; lead accumulator. (The nature of the electrodes when charged and discharged should be known, but details of the chemical processes involved should not be required.)

(d) The magnetic field due to a current, galvanometers for detecting currents, force on a current-carrying conductor in a magnetic field (treated qualitatively), the moving-coil galvanometer, ammeters, the simple motor; moving-coil loud-speaker.

(e) Faraday's laws of electrolysis with simple numerical applications.

(f) Ohm's law; potential difference, resistance, electromotive force; voltmeters; comparison of resistances by meter bridge; resistivity; shunts. Comparison of e.m.f.'s with potentiometer.

(g) Heating effects of current; kilowatt hour; consumption of energy in D.C. circuits, costs of domestic supply.

(h) Experiments to illustrate the fundamental phenomena of electromagnetic induction; direction of induced currents; simple forms of A.C. and D.C. dynamos.

(i) Simple demonstration of the magnetic, heating and chemical effects of A.C. One type of A.C. ammeter. The comparison of the behavior of a condenser in an A.C. and a D.C. circuit. Effect of a choke on the strength of the current in an A.C. circuit. Transformers; advantages and disadvantages in using A.C. and of high voltage transmission.

(j) A simple study of the production and properties of electrons; the diode valve as a rectifier.

How Can We Decide What to Teach? *

By Harold H. Drummond**

HOW can we decide what to teach? Let me share with you my own concerns about this basic curriculum question. I wish I knew the answer. There are times — brief moment they are — when I wish I could give you the final word today so that you would nevermore hereafter have to worry about deciding. For just a second or two I wish that **I** could be sure — that **you** could be sure — but then I realize, as Elmer Davis has so simply stated the rebuttal, **"But We Were Born Free."**

This nation was conceived in liberty and dedicated to the principle — among others — that honest men may honestly disagree; that if they all say what they think, a majority of the people will be able to distinguish truth from error; that in the competition in the market place of ideas, the sounder ideas will in the long run win out. For almost four years past we have been engaged in a cold civil war — it is nothing less -- testing whether any nation so conceived and so dedicated can long endure.

I believe it will endure, but only if we stand up for it. The frightened men who are trying to frighten us, because they have no faith in their country, are wrong; and even wronger are the smart men who are trying to use the frightened men for their own ends. The United States has worked; the principles of freedom on which it was founded — free thought as well as political liberty — have worked. This is the faith once delivered to the fathers — the faith for which they were willing to fight and, if necessary, die, but for which they fought and won. Those men, whose heirs and beneficiaries we are, risked, and knew they were risking, their fortunes and their sacred honor. We shall have no heirs and beneficiaries, and shall deserve to have none, if we lack the courage to preserve the heritage they left for us... This will remain the land of the free only so long as it is the home of the brave.[1]

And so I'm fundamentally glad that I don't have the answer for you today — **for you were born free.** But decisions have to be made. They cannot be put off. Every day teachers in the schools you represent have to decide: