

**An Experiment in By-Product Teaching.** The observation here described was planned in answer to the question, Can the by-product method of teaching be profitably applied to the subject of political science? By the by-product method is meant the selection of certain mental powers or habits which are of special importance (in the settlement of government questions, for example) and the conscious direction of the student's attention to the development of these mental powers. The question is of some practical moment because the study of government is supposed to lend itself peculiarly to the formation of some such mental habits, although this fact has never been demonstrated. In making the experiment it was decided to concentrate on a single mental process, i. e., analysis, embracing (a) the detailed *scrutiny* of a subject, (b) the *dissection* into its parts, (c) the appraisal, or *evaluation*, of the parts, and (d) the *selection* of those which are essential.

The question then became, What would be the effect of a vigorous cultivation of analysis, with the aid of timely "advertising" to the student, during the ordinary operation of a course in government? Is it feasible to arrange the material of such a course so as consciously to develop the power of analysis? And if so, could this increased power be applied in other subjects outside the field of government? If we answer "yes" to these questions, the conclusion may well be that some readjustment of our present methods of teaching political science can profitably be undertaken.

The following specifications were laid down for the experiment: (1) the instruction in analysis must be a part of the regular course work, using course material; (2) it must be concentrated within a comparatively brief period, in order that if any change in analytical power took place it could not be attributed to the general mental growth of the student; (3) two tests of equal difficulty must be given, one immediately before and one after the period of training in analysis; (4) the tests must be in a field outside the domain of the course, in order that any possible change which might be registered in the second test could not be ascribed to a better general knowledge of the subject as a whole; (5) the tests must be focused chiefly on ability to analyze; (6) the tests and the intensive instruction in analysis must be given to a sufficiently large number of students to show a general average or trend.

Certain features of the intensive training were also fixed in advance: (1) the students were not informed at the time of taking the tests of their exact purpose; (2) they were, however, constantly re-

mind of the value of the analytical process and of its component parts or steps—detailed scrutiny, dissection, evaluation, and selection. Their interest was spurred by repeated reference to men in public or business life who showed especially keen analysis in their statements. Instances were frequently brought up to show illustrations of faulty or good analysis. The varied uses of this mental power were often mentioned. In short, the student was made to feel that the possession and development of this quality ranked high in importance. Analysis was advertised and sold to the student. In order that the training in analysis might not detract from the regular work of the course, but be an aid to it, most of the examples quoted, and all of the exercises given, were taken from the subject-matter of the course; and intensive training was carried on during a four-week period.

Opening with a sixty-word statement describing the chief steps in analysis and an invitation to try them on the regular course material, a four-week campaign was conducted, during which the student himself prepared five exercises and received ten comments or reminders from his instructor. The exercises, in brief, were: *No. 1.* A series of statements, 350 words in all, about the U.S. Secret Service, the *Literary Digest* poll of the presidential vote, and the Kellogg peace treaty. The student was asked to distinguish between statements of fact and statements of opinion. *No. 2.* A selection from Burke's "Conciliation with the Colonies," accompanied by three outlines or summaries of this selection. The student was asked to state which summary was the best, and why. *No. 3.* A summary of the decision in *Pensacola Telegraph v. Western Union*, giving (a) facts, (b) questions at issue, (c) decision, and (d) reasons for decision. The student was asked to build a similar summary of the decision in the Daniel Ball case. *No. 4.* A paper giving the four most important points in the speeches of Mr. Hoover at Newark and Governor Smith at Denver. *No. 5.* A highly detailed analysis of a lengthy assigned reading, showing which parts were essential, and why. Interspersed with the exercises were ten comments on or illustrations of successful or poor analysis by men in public life, or by newspapers and magazines, in comments on public affairs.

Two analytical tests of equal difficulty, one immediately before and one immediately after the period of training, were conducted. In order to insure equal difficulty, the tests were submitted to a committee of five experts, under the direction of Dr. Leroy A. King, professor of educational measurements in the University of Pennsylvania. The committee certified that the second test was at least as difficult as the

first, and some members thought it more so. Both tests were chosen from the field of dream psychology, being condensed summaries of articles on this subject. The student was asked to read these and then answer five questions concerning the material read, the questions being so framed as to require an accurate comprehension and evaluation of the material. The tests and exercises were prepared and conducted by Mr. Edward W. Carter and members of the staff in charge of Government 1. The subject covered by the tests was new to the student, the class having not yet taken up the study of psychology. A standard set of answers was arranged for grading to assume uniformity, and the same staff graded the answers in both tests.

Two hundred seventy-seven students took the first test and 279 the second. An improvement in analysis of 14.9 per cent in the average grade per student was registered. A small segregated group of seventeen exceptional students showed higher ratings in both analysis tests and a better than average rate of improvement. These results confirmed those of a similar experiment made in the previous academic year. In that year, however, the training was less intensive. Only one-half as much attention was devoted to the by-product, and an increase of nine per cent in the average grade on analysis was shown.

JAMES T. YOUNG.

*University of Pennsylvania.*