

4-1951

The Inductive Compared With the Deductive Approach to Teaching Secondary School Chemistry

Clarence H. Boeck
University of Minnesota

Follow this and additional works at: <https://digitalcommons.morris.umn.edu/jmas>



Part of the [Chemistry Commons](#), and the [Science and Mathematics Education Commons](#)

Recommended Citation

Boeck, C. H. (1951). The Inductive Compared With the Deductive Approach to Teaching Secondary School Chemistry. *Journal of the Minnesota Academy of Science, Vol. 19 No. 1*, 57-58.
Retrieved from <https://digitalcommons.morris.umn.edu/jmas/vol19/iss1/20>

This Article is brought to you for free and open access by the Journals at University of Minnesota Morris Digital Well. It has been accepted for inclusion in Journal of the Minnesota Academy of Science by an authorized editor of University of Minnesota Morris Digital Well. For more information, please contact skulann@morris.umn.edu.

4. The experiments were judged suitable for performance with simple and inexpensive materials. Even a school with a meagre amount of equipment may teach an acceptable laboratory course in general science.

5. The importance of demonstration in a general science course is illustrated.

6. Since 71 per cent of the experiments lend themselves to the individual laboratory method of teaching, it seems that this method is not only appropriate, but is worthy of much wider use than is generally made of it.

1 1 1

THE INDUCTIVE COMPARED WITH THE DEDUCTIVE APPROACH TO TEACHING SECONDARY SCHOOL CHEMISTRY

CLARENCE H. BOECK
University of Minnesota

The purpose of this study was to compare through experimental evaluation the learning of students instructed in such a manner as to stress the use of the inductive approach in high school chemistry laboratory exercises and correlated discussions with the learning of students who were instructed by the use of the more commonly found deductive-descriptive exercises.

The inductive and deductive classes were chosen by random sampling from the 1948 chemistry enrollment of University High School. Seven additional control groups were chosen randomly from Minnesota schools having the same general size as University High School. Each of these control groups participated in the measurement of only one part of the total study. No attempt was made to control the type of teaching in these classes but careful evaluation indicated it was essentially of the deductive type.

All students were given an intelligence test and were pre-tested and post-tested to measure: (1) their knowledge of facts and principles; (2) their ability to apply principles in new situations; and (3) their knowledge of and ability to use the methods of science with an accompanying scientific attitude. University High School students were also given retention tests four months after the completion of the course and "end of the term" examinations for laboratory skill and resourcefulness.

Analysis of variance and covariance was the basic technique used in the analysis of data concerning only University High School groups, the central experiment. In its use pretest and intelligence quotients were held constant in the analysis of the non-laboratory data. For the laboratory skill and resourcefulness data, only intelli-

gence quotients were statistically controlled. Analysis of data involving comparisons between the University High School and the outside control groups made use of Wishart's modification of Fischer's "t" test in which means were adjusted for differences in intelligence quotients and pretest scores. For these two general classes of analysis, the five per cent and one per cent levels of significance, respectively, were selected for rejection of the null hypotheses under consideration.

For the University High School experiment differences large enough to be significant were found in favor of the inductive group for knowledge of and ability to use the methods of science with an accompanying scientific attitude and identification of proper laboratory techniques. For all other outcomes the differences were in favor of the inductive group but were not large enough to be significant.

Results from using retention examinations showed differences of about the same magnitude as the post-tests. These were not found to be significant; probably because the number of students involved in the testing and thus the number of degrees of freedom were reduced to about one-half by graduation, thereby requiring much larger differences for indications of significance.

A significant advantage for the University High School inductive group over one of two control groups for knowledge of facts and principles and application of principles was found. The class using the inductive approach was superior to all three outside control classes with respect to scientific method and attitude.

In conclusion, the acceptance of the inductive approach for use with chemistry classes at University High School was justified and this method of instruction is now in use. Although this recommendation would likely be valid for the schools of the state, further validation through a cooperative experiment using a representative sampling of all the schools of the state would be necessary.

1 1 1

THE USE OF THIOACETAMIDE IN PLACE OF HYDROGEN SULFIDE IN SEMI-MICRO QUALITATIVE ANALYSIS

WILLIAM J. TOMSICEK
College of St. Thomas