tion, they may be consequently accommodative or correlational, incidentally adaptive, or wholly inutile in their functional relations. D. T. MACDOUGAL

EDUCATIONAL AND INDUSTRIAL EFFICIENCY

THE latest bulletin of the Carnegie Foundation has many attractive features. The report has evidently been made up in a spirit of good will to education, and any sting that it may contain should be removed by the admirable introduction by Dr. Pritchett. In the course of more than a hundred and thirty large pages the author, Mr. Cooke, makes a number of excellent suggestions, which are none the less excellent because of their lack of novelty. He is aware that the charge of Philistinism might easily be suggested by the tenor of his remarks and he makes some effort to protect himself accordingly. His peculiar point of view seems to give undue prominence to "the cost per student hour," but although we hear much of this phrase in the report we are distinctly told in one place that "It should be borne in mind that the cost per student-hour has absolutely no value in distinguishing relative educational values." If this had been placed as a headline to all the pages, it would have greatly improved the value of the report, and would have been in harmony with this other admirable sentence which might with equal propriety have been inserted as a foot-note to every page: "In the last analysis the usefulness of a university is the measure of its mental, moral and spiritual product—and product interpreted as broadly as you please."

However, although there is much that is excellent in the report, it has many weaknesses. It is written from the point of view of the man who is used to report on the efficiency of a glue factory or soap works. Whenever it touches the strictly educational field and gets away from the factory the trail of the amateur is over it all. It is full of commonplaces, and there is scarcely a question raised that has not been discussed *ad nauseam* by college professors and other officers. It is not lacking in confidence. One marvels at the temerity even of an "efficiency engineer" who can lay down the law so definitely as to how to teach physics, how to conduct a recitation, how to carry on research, when most of us who have devoted our whole lives to such problems are far less confident. There are, however, here and there some pleasing evidences of diffidence. In discussing the important educational problem of janitor service Mr. Cooke says, "A sharp line should be drawn, *probably,* between the cleaning of the buildings and the care of apparatus." The use of the word "probably" is a master-stroke. It conjures up pleasing pictures of janitors handling the delicate instruments of a physical laboratory just as they furbish the brass plates of a glue factory—if indeed "the snap and vigor of the business administrator" which Mr. Cooke admires so much decree that such things are a necessary adjunct to the dignity of the factory. Almost on a par with this use of "probably" is the statement that "There is a good deal of the feeling that lectures to be good must in a way bear the marks of the inspiration of the moment. But a good many men who have the reputation of being high authorities assured me that the carefully thought out plan for a series of lectures would win out every time over the inspiration of the moment idea." Of course they assured Mr. Cooke of this, but they must have smiled at the naïveté of the question and wondered who ever suggested that the presentation of a scientific subject be left "to the inspiration of the moment."

The report shows many evidences of ignorance of the history of education. It suggests as novelties plans that have been tried for centuries and abandoned only after careful consideration. Such, for example, is the suggestion that the rules for the conduct of the students and the punishments for their breach should be put into precise form. The collection of such rules from the archives of the older universities would fill many volumes. Again he says, "It may turn out that ultimately the matter of examinations will be handled by an agency outside of the depart-

ment." This, to his vision, is a far-off divine event to which the whole educational creation is moving. If so, it is moving backwards.

Mr. Cooke's remarks on the economic use of rooms and buildings are, for the most part, eminently sensible, although he contributes nothing new to the discussion of a very old problem. His economic sense is shocked on learning that a lecture room in the department of physics is used only four hours a day, just as it must be shocked when a church is used only a few hours a week, or a life belt only when it is actually needed. In some of his criticisms under this heading he seems to forget that colleges have to make the best of the materials that are available and that in many cases an apparently uneconomic use of rooms is forced upon them because their buildings are old, or were designed for other purposes than those to which they have now to be put. He commends one institution for a space-saving device and wonders that it is not adopted in all departments, the fact being that the newer buildings were designed for its use, but the older ones were so constructed that its adoption there would not have been a real economy.

Mr. Cooke displays unusual weakness when he takes up the subject of research. Indeed most of what he says on this subject must be received with that mixture of astonishment and embarrassment with which we listen to the words of a distinguished friend who pronounces an absurd judgment on an important subject that he has evidently not mastered. Listen to this. "I believe there is a distinct disadvantage to undergraduate students to be near research work. I think in the case of physics research workers, their good *influence is more often offset by the introduction into the undergraduate laboratories of the necessarily deliberate and experimental methods of the research laboratory*"!! How unfortunate if "deliberation" and the "experimental method" should contaminate the laboratories —it might detract from the "snap and vigor" of these promising undergraduates. And yet one wonders what possible use there can be in teaching physics at all, if so much care is to be taken to guard the students from catching its spirit and grasping its method. We, in our ignorance, had imagined that the method and the spirit of science were its very essence, especially where undergraduate learning is concerned. We should have accounted any system of education that failed to recognize this as but so much dross and dung (if, at this season, a Scriptural phrase may be permitted) even if it resulted in every undergraduate gaining 100 per cent. in the examinations conducted by Mr. Cooke's "bureau of inspection."

Perhaps enough has been said to indicate that there are serious blemishes in this bulletin. If, however, it be taken for just what it is worth, it can do no harm and may do much good. We should regard as a friend every one who helps us to improve our methods and if this report enables us to keep our accounts better, or make a more economical use of our machinery, of course it will be heartily welcomed. The most serious objection that I see to it lies in its abuse rather than its legitimate use. I fear that it will tend to increase the administrative machinery of our educational institutions, machinery that is already far too much in evidence. When one listens to all the criticism of our colleges and thinks of the great things that have been accomplished elsewhere with so little machinery and so little noise, one wonders whether it might not be better for us also to settle down to quiet work. Then I confess that all this talk of "cost per student hour" strains my patience to the limit, especially when it is presented under the heading "gauge of efficiency." Mr. Cooke frankly recognizes its usefulness to this end, but others may be led astray by the specious analogy with the workings of a factory. A college that had reached the acme of perfection as gauged by Mr. Cooke's standards might be highly inefficient as an instrument of real education. Mr. Cooke tells us that in studying the colleges he has constantly held in mind "the equivalent mechanism" used in the industrial world and apparently he looks forward with pious expectation to the day

when our colleges will run with the uniformity of looms in a mill. Granting with Mr. Cooke that there is much that the administrators may learn from the mill manager, it is to be hoped that enlightened public opinion will never permit us to forget that in all matters that are really vital to education there is no "equivalent mechanism" in the industrial world. We are not making shoes or bricks or cloth, but are dealing with material of the utmost complexity and variety, with no two specimens quite the same and no two that need just the same treatment. Uniformity in the product is not only unattainable, it is not even desirable, and factory methods are entirely out of place. If we neglect the human factors in our education we are lost and we can not overlook the fact that, without such bulletins as this, there are already plenty of forces at work to give sufficient prominence to mechanical conceptions and mechanical tests. Nor does it require any special effort in this country to stimulate admiration for the "snap and vigor of the business administrator," while the value of snap in the domain of education may very easily be overestimated. Especially am I fearful of its effect on the teacher and the investigator. His path is not too smooth already and even now there are many forces drawing him from the educational sphere where best he can serve society. Think for a moment of the effect on men like Newton or Faraday of the "snap and vigor" treatment that Mr. Cooke suggests in his discussion of research. They must make frequent reports on the progress of their research and constantly justify the expenditure thereon. The superintendent of buildings and grounds, or other competent authority, calls upon Mr. Newton.

Supt. Your theory of gravitation is hanging fire unduly. The director insists on a finished report, filed in his office by 9 A.M. Monday next; summarized on one page; type-written, and the main points underlined. Also a careful estimate of the cost of the research per student-hour.

Newton. But there is one difficulty that has been puzzling me for fourteen years, and I am not quite . . .

Supt. (with snap and vigor). Guess you had better overcome that difficulty by Monday morning or quit.

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MASSACHUSETTS INSTITUTE
OF TECHNOLOGY
December 24, 1910

SCIENTIFIC NOTES AND NEWS

AT the recent annual meeting of the American Anthropological Association, held in Providence, R. I., officers were elected as follows: *President,* Dr. J. Walter Fewkes, Washington, D. C.; *Secretary,* Dr. George Grant MacCurdy, New Haven, Conn.; *Treasurer,* Mr. B. T. B. Hyde, New York, and *Editor,* Dr. John R. Swanton, Washington, D. C.

THE following officers of the American Fern Society were recently elected for 1911: *President,* Dr. Philip Dowell, Port Richmond, N. Y.; *Vice-president,* Miss Nellie Mirick, Oneida, N. Y.; *Treasurer,* Mr. Harold G. Rugg, Hanover, N. H.; *Secretary,* Mr. L. S. Hopkins, M.A., Pittsburgh, Pa.

ON December 20 the Paris Académie de médecine held its annual election, Professor Lannelongue, the vice-president, assuming the presidency and Dr. Gariel, professor of medical physiology at the Paris Medical School, being elected vice-president.

LORD AVEBURY has been elected a corresponding member of the Paris Academy of Sciences, in the section of anatomy and zoology.

THE section of chemistry of the Royal Academy of Science of Stockholm has elected Mme. Curie a foreign member in place of the late Professor Cannizzaro.

MR. ERNST LEITZ has received from the University of Marburg the honorary degree of doctor of philosophy on account of his services to science in having constructed for over fifty years instruments of scientific value.

A 450-acre forest reserve in Vermont has been named the "L. R. Jones State Forest" in recognition of the services of Lewis R. Jones, for twenty years associated with the