true that this evidence has reference chiefly to the children attending State schools, but the only difference this makes is that to their evidence is attached always the confession that, through lack of time and money, the system of teaching which they would most recommend cannot be pursued. To our public schools this certainly should not apply. Moreover, if it be right that workmen should have some knowledge of the scientific principles underlying the trades in which they are employed, how much more those who employ workmen and design and direct their work.

There is one other way by which especially these powers of observation and designing may be cultivated, and that is by the teaching of drawing and of decorative design. As to the importance of teaching drawing and the great practical value of it, there is complete unanimity, so that I need say nothing in favour of it. But I wish to call your attention to the fact that the system of teaching drawing which is capable of producing and is producing such good results is not the old system under which the students merely made copies of outlines and copies of pencil sketches with plenty of shading in them. One of the most important features of the new method is that the children are taught and encouraged to make decorative designs for themselves, and to apply these designs to the actual production of decorated work, stencilling, wood-carving, modelling, painting, and so on. This is the method pursued in Leland's large school in Philadelphia, which the American Commissioner of Education has pronounced a great success, and of which you will find an account in Leland's book on practical education. I think it may be accepted as proved by experiments in America and elsewhere that it is easy to teach artistic designing to children, that capable teachers are easily made, and that, most wonderful and most important, the majority of children will make good designers. It has been found, too, that it educates their intelligence very largely, and it supplies them with a form of work for hands and eyes when they are too young to undertake any other. You see a child is easily made happy with coloured cubes or stencils, or pencils, or paints, and if his teacher shows him how to put together designs with these he has an occupation which is to him full of the liveliest interest, and which encourages his faculty of observation, his originality, and educates his taste and good feeling. Moreover, something tangible is produced, something to look at and be proud of, and this gives him a consciousness of power and an encouragement to try and do better. It is the making of the design that is the first and most important step, and which is of the most value as a mental training. It is found that when the designs are once made the children find little difficulty in giving them concrete expression, whether in clay, or wood, or leather, or in dozens of other materials and ways; their natural anxiety to do so soon helps their eyes and hands to acquire the necessary skill.

And though I am advocating the teaching of artistic designing as a means of training, it is impossible to avoid saying something of other advantages of such teaching. Independently of the increased happiness which such pleasant occupations must give to children's lives, it is plain that their good taste and power of criticism must be greatly developed; that in decorative work at all events they must learn to distinguish between what is true and necessary and what is false and unnecessary. This will make a very great difference in the nature of the surroundings such children will make for themselves when they grow up; those who have tried themselves to draw and to design can appreciate most keenly the good work of others. In short, the teaching of design is the most thorough way of educating taste. It must not be forgotten, too, that there is scarcely a single trade or industry in which a knowledge of design is not exceedingly useful. There is, too, a large demand for good designs of all sorts, and as taste improves the demand is likely to increase.

To sum up what I have said, our system of education will be greatly improved if more attention be paid to the teaching of our students to observe, to reason from observation, and to design. I have tried to show how it is possible to do this in mathematics, especially in geometry, and that the study of science and of drawing can be amplified so as most satisfactorily to fulfil this purpose. And I want to point out that this way is easier and more interesting to both teacher and scholar. It is more calculated to arouse interest and enthusiasm and earnestness, and unless a boy shows these in the study of a subject he may by such study be adding to his stock of knowledge, but he is scarcely advancing his education nor learning how to learn. More enthusiasm is aroused, in the first place, because a boy's power and love of finding out things for himself are developed; and, in the second, because hands and eyes are called into play.

And there can be no doubt that a boy so trained would far more readily find work to do on leaving school than one not so trained. His knowledge of drawing and his grounding in experimental science would make him more valuable to an employer, his habits of observation and enquiry would make him more able to adapt himself to any new position and enable him to learn and advance more quickly

therein. Moreover, and this is one of the most important results of such training, the facts of his having been trained to work with his hands and eyes, and of his having found out the large amount of intelligence required and the delight experienced in doing good work with them, would often make him prefer an occupation in which their use was important to an occupation purely literary or clerical; and I doubt whether there could be a class of men more valuable to the colony than one accustomed to use scientifically and intelligently their hands and eyes.

It is a boy so trained who, if he intends to be a farmer, will most profit by the instruction given at the Agricultural College; if he intends to be a mining engineer, at the new School of Mines; indeed, if boys without such training devote only a few hours in the week to the work at the School of Mines, it seems to me that the teaching they will receive will be scrappy and disappointing. The same thing is true of the University; not the least important part of the work we can do here is to supply higher scientific instruction to those who, at work for the most of their time, can yet find sufficient leisure to attend classes on mathematics and science, and so render themselves more qualified to advance in their occupations; but unless these students have had a thorough preliminary training it is impossible that they should, to any great extent benefit by the instruction the University can give.

In order to give point to what I have said, and to show its practical bearing, let me repeat to you some statements made to me by two men, eminently representative of two of the chief industries of the colony—Professor Lowrie, of the Roseworthy Agricultural College, and Mr. Cloud, the Manager of the Wallaroo Smelting Works. I had asked these gentlemen whether such improvements in our manner of education, as I have tried to describe, would not be of great advantage to boys about to become farmers and mining engineers; and they were kind enough to give me their opinions on the point. After speaking of the great advantage that a knowledge of drawing would be to his students at the Agricultural College, both as a means of education and as a help to learning botany, Professor Lowrie goes on to say—"Boys trained in the way you suggest would be most desirable pupils here, and would take a lively interest in our experimental work. They would make better farmers, in so far as having been trained to reason carefully they would be so much less likely to fall into errors. Perhaps you may have noticed that such questions as 'The advantages or disadvantages of deep draining,' or 'The merits of bare fallowing compared with manuring,' are perennial among farmers, but a man that has had a good training in experimental science would at once set about to settle these questions by direct exact work on his own farm. That the introduction of experimental teaching would raise the status of farming as an occupation there can be no doubt; for it would bring into the work men more or less imbued with a spirit of research, who would find a wide field for such before them and much opportunity for the most interesting work." And Mr. Cloud says to me—"There is no doubt at all in my mind that a boy who has been properly trained in one or two elementary sciences—especially physics and chemistry—would make his way very much faster as an apprentice to a mining engineer or a metallurgist than a boy not so trained, other things being equal. If he went to a school of mines, he would be a much apter pupil. The fact of his having the elements of even one science at his fingers' ends would give him an advantage in grasping this particular subject, and the mental training thus obtained at school would enable him to more quickly grasp the methods and matter of any other which might be brought before him at the School of Mines; and if I could obtain lads fresh from school having had such an education as you sketch out, they would be worth to me as much or more at 16 years of age than those I obtain now when they are 20."

In conclusion, let me say that whilst I am trying to show how our manner of teaching might be improved, I have not the wish, and I do not think I have right or cause, to find fault with the teachers. Teachers labour under two great disadvantages. In the first place, there is no place where they may learn how to teach; and in the second place, when they find out for themselves that changes are desirable the strong compulsion of routine often prevents their making them. If all those of us who teach mathematics and science in the colony were to combine for the purpose of improving the teachings of these subjects we might do something, but to effect any general and thorough improvement it is necessary that the public generally, and especially such as have children to be educated, should be convinced of the necessity of them. My intention in what I have said is not so much to point out to teachers better ways of teaching as to tell the public generally that better ways exist; to interest them and lead them to enquire into the subject for themselves. As soon as they are convinced that improvements are desirable, and have a sound and approximately uniform knowledge of what these improvements are, teachers will easily and naturally make them.

The CHANCELLOR thanked Professor Bragg on behalf of the audience for the very able, clear, suggestive and practical address to which they had listened. (Cheers.)

The proceedings then terminated.