

Government of Madras.

EDUCATIONAL DEPARTMENT.

Recd.

Regd.

} 1907.

Enclosures

Spare copies

G.O., No. 16, 10th January 1907.

(49)

University Regulations.

Recording, with remark, memorial from M.R.Ry. Rajagopalachari, Joint Secretary to the Council of Native Education, drawing the attention of Government to certain changes proposed to be introduced in the matriculation curriculum of studies by the Madras University with special reference to the teaching of Geometry in the Madras Presidency.

BACK PAPERS.

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GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

READ—the following paper:—

Letter—from S. RAJAGOPALACHARI, B.A., Assistant Master, Pachaiyappa's College, Madras (Joint Secretary to the Council of Native Education, Madras).
To—the Secretary to Government, Educational Department.
Dated—Georgetown, the 30th December 1906.

I respectfully beg to draw the attention of His Excellency the Governor in Council to certain changes proposed to be introduced in the Matriculation curriculum of studies by the Madras University with special reference to "the teaching of Geometry in this Presidency".

2. For the last thirty years pupils in this country were learning Theoretical Geometry in ordinary schools (the basis of instruction being Euclid) and Practical Geometry in the School of Arts and other Technical schools (the basis of instruction being various text-books). The Senate of the Madras University by its recent Regulations has removed this distinction and further removed Euclid as a subject of study and substituted in vague terms "Geometry, Practical and Theoretical" in its place and has drawn up a syllabus. The Senate has thus effected a reform in this country which continues even to-day an unaccomplished fact in England after thirty years' agitation.

3. In England an agitation for the reform of school teaching was started first by the Association for the Advancement of Science in 1860 and secondly by the Association for the Improvement of Geometrical teaching in 1871. In 1881 the association widened its basis so as to include all branches of Elementary Mathematics and eventually in 1894 the name was changed into the Mathematical Association. The Geometrical Association made repeated but ineffectual attempts to persuade University authorities to permit departures from Euclid's sequence. DeMorgan, Lewis Carrol and Cayley openly avowed their preference for Euclid. The British Association was unable to carry out any reforms. The development of Engineering and particularly of the electrical branches necessitated the training of a body of students quick in action and decision. Perry's crusade against Euclid began in 1901 at the Glasgow meeting; still the Universities were reluctant to make changes. As there seems to be some misapprehension as to the nature of that agitation started by Professor Perry, I beg leave to point out the result of that discussion on the teaching of Mathematics. Out of 18 speakers who took part in that discussion 11 referred to the subject of Euclid, no less than 6 were in favour of retaining Euclid, only 4 were against it. Various syllabuses as are at present recommended by the Senate of the Madras University had been recommended by various authorities with what results the following quotations will serve to show:—

(a) Professor Horace Lamb said: "A good text-book to replace Euclid is much wanted . . . also it should be Euclidian in method if not in phraseology. If anything else is attempted a disastrous muddle will ensue to be followed after few years by a reversion to Euclid as happened once, I think, in Italy. I have little to

say on the subject of the syllabus, except that as a rule, I object to all programmes, and schedules, and 'courses.' A's 'system' of teaching Chemistry, B's 'system' of teaching Drawing or C's 'system' of teaching the Piano, may be very good as a method elaborated by A, or B, or C, for doing his own work; but in other hands it is likely to become as mechanical and wooden as any other."

(b) W. D. Eggar wrote: "I feel that some of your (Perry's) proposed innovations might lead to disaster in the hands of a teacher not fully gifted with judgment."

(c) W. P. Workman said: "I am not clear that it (the proposed reform) lays sufficient stress on the training in exact thought which our present system certainly supplies, though possibly, probably even, at excessive cost in time He further observed "a good mathematician may be trusted to teach according to Professor Perry's proposals, and to get more out of it than he did from the older, because it will evoke far more interest. An indifferent mathematician would do much harm, because so much is left to his own badly trained initiative".

(d) Sir Philip Magnus wrote: "but if the aim of mathematical teaching is rather brain development, accuracy in calculation and in measurement, the acquisition of correct methods of reasoning or even a training that helps discovery, then I am not sure that Professor Perry's 'royal road' is altogether a safe one for ordinary children. So for the purposes of general education a boy cannot be said to be learning mathematics by merely acquiring dexterity in the use of mathematical tables. I do not think Professor Perry meant all he said It must not be forgotten, however, that the process of teaching a child to *discover* is not a rapid method of arriving at results and may tend to retard rather than quicken progress as measured by worked chapters of our school text-books."

(e) The British Association Committee on the teaching of mathematics say "an examining body might retain Euclid to the extent of requiring his logical order" (School World, October, 1902).

4. Everywhere the drawing up of syllabuses is the order of the day. The Calcutta Regulations closely follow those of Cambridge, and the Bombay and Madras follow those of Calcutta, but these attempt at grouping the propositions under different headings which any schoolmaster of ordinary ability can do. It is no wonder that the want of a proper substitute for Euclid has been felt at home as in this country. There, as here, also the financial difficulty of providing qualified teachers and the impracticability of giving effective teaching to large classes have been no less felt.

J. Larnier writes in the following way: "The difficulty in regard to them (Professor Perry's proposals) is a practical one, there is the question of expense: to carry out such a proposal involves small classes and much individual attention to dull pupils, whereas the present more routine methods have been evolved largely in order to enable a single teacher to supervise a large class. There is the difficulty of obtaining a sufficient supply of elementary teachers who could be trusted to pursue a more unfettered course without exaggeration or wrong headedness."

Thus after thirty years' experience in England no workable and definite syllabus has been evolved so as to make the study of the subject uniform. The conclusion is irresistible that Euclid cannot be replaced as a branch of study by any syllabus of practical and theoretical Geometry in this country where the qualified teachers of practical Geometry have yet to be trained.

5. During the last thirty years, Euclid has been a part of the Lower Secondary curriculum of studies also. Euclid's elements of Geometry, Book I, was practically a compulsory subject for the Lower Secondary examination from the seventies and as such it was taught in all ordinary schools, latterly it was taught as an optional subject and continued in the Lower Secondary curriculum of studies from 1879 to 1899. The subject was removed from the curriculum of Lower Secondary studies by a notification issued by the Director of Public Instruction in November 1900. The Government notification approving of this removal appeared in November of the following year. The following facts may be adduced to show that Euclid's elements was a favourite optional subject with the boys. The Government Orders recording the annual reports of the Government examinations contained the following. Geometry

and Algebra among males and needle-work among females continued to be the most popular of the optional subjects. The following figures show the number of candidates that took up this as an optional subject :—

	Elementary Science.	History of England.	Geometry and Algebra.
1897	297	438	7,561
1898	547	499	9,147
1900 and 1901	Figures not available.		
1902	247	268	3,244

With a view however to elicit the real state of opinion I forwarded a circular letter to the Headmasters of High schools and other educationists throughout the Presidency soliciting their opinions on the question whether Euclid should or should not be reintroduced in the *Lower Secondary course*. Out of 84 replies received, about two-thirds, 55, were in favour of the reintroduction, while three were neutral.

6. The Council of Native Education had taken the trouble to ascertain the views of the Headmasters of High schools and other educationists regarding the recent action of the Senate and I beg to append a summary of their replies. Out of 68 replies as many as 58 are for retaining the existing order of things on the grounds mainly :—

“(a) Proposed change as regards Matriculation Geometry will assuredly introduce indefiniteness as to the scope of study and will certainly be responsible for many failures in the Matriculation examination.

“(b) Practical Geometry is a technical subject and may stock the memory with useful formulæ and rules which the pupil need not prove to himself by systematic reasoning. It can never be a substitute for Euclid which aims at giving that training to the mind which would be serviceable in the logical study of every other subject.

“(c) Since no standard authority exists in modern Geometry I consider the attempt to replace Euclid as premature.

“(d) Euclid teaches a man whether a conclusion follows from the premises given. Its value as a mental discipline is incalculable. Practical Geometry, if it does not contain much of Euclid, is an inferior substitute ; if it does, is a superfluous luxury.

“(e) Euclid must continue to be the basis of instruction in Geometry with a view to secure uniformity in teaching it and to avoid indefiniteness in the curriculum in that subject.

“(f) Euclid continues to be the basis of instruction in Elementary Geometry for the Oxford, Cambridge, Dublin, Aberdeen and even for London University examinations, I think it should be so for Madras also.

“(g) Euclid should be retained, because there is no book better adapted for mental training.

“(h) Practical Geometry, while giving a good training to the eye and the hand does very little by way of developing the intellect and the reasoning faculty of the student. The High schools as they are manned now have not many teachers who can do justice to new subject if entrusted to them.

“(i) Euclid as an intellectual developer has no rival and that it can never be ousted from the school curriculum without causing irreparable loss.

“(j) If Euclid is to be replaced by any other book, there has not been a book treating of the subject, which though very much suited for Art and Technical schools, is so far suitable for schools for general education.”

A summary of the arguments.

7. (a) Whatever be the conditions in Germany and in France, which must have rendered necessary some substitute for Euclid this country is not prepared for such a change.

(b) For the Oxford, Cambridge, Dublin and even for the London University examinations Euclid continues to be the basis of instruction in Elementary Geometry.

(As a proof that Euclid is not to be abolished, the fact that the Pitt Press Edition of Euclid is recommended by the Cambridge authorities as a text book may be mentioned. Rupert Deakin, M.A.).

(c) For the preliminary examination conducted by the Madras Civil Engineering College recently Euclid was the Examination text-book.

(d) Euclid continues to be the basis of instruction for boys in European schools. The Educational department apparently does not view the Senate's revolutionary changes with great favour.

(e) No substitute for Euclid has been found in England after thirty years' agitation. Present day publications have yet to establish a name. Some of the books that have recently been published with the object of providing such a substitute however suitable they may be for Art and Technical schools are unsuitable for ordinary schools.

(f) The syllabuses issued by the Calcutta, Bombay and Madras Universities under the new University Act contain nothing which any decent text-book of Euclid does not contain so far as theoretical Geometry is concerned ; on the contrary they contain much less.

(g) Practical Geometry will no doubt train the hand and the eye, but it is much more suitable for Lower Secondary classes. Effective teaching of Practical Geometry is impossible with our large classes.

(h) Such teachers as we have cannot be familiar with any syllabus that may be newly elaborated. It is essential that the foundations of the subject ought to be laid by competent hands.

(i) Euclid was an extremely popular subject with Lower Secondary candidates as an optional subject before the prohibition of its teaching in 1902.

(j) The numerous failures in the Matriculation examination in Science for many years and in History and Geography during recent years are largely due to want of definiteness in the scope and extent of the curriculum in those subjects. The proposed change in Geometry teaching will introduce a similar indefiniteness and may be responsible for further failures.

(k) The majority of invited opinions from the Headmasters of High schools is against the Senate's proposal.

8. I beg leave to send for your kind acceptance the following printed papers from which I have taken extracts :—

(a) Circular letter of the Council of Native Education to the Headmasters of High schools, dated 12th June 1906.

(b) My circular letter to the Headmasters of High schools, dated 26th November 1906. (This letter is not yet circulated since the schools are all closed.)

(c) Replies from the Headmasters of High schools and other educationists to the circular letter of the Council of Native Education, dated 12th June 1906.

(d) Geometry teaching in this Presidency.

(e) Desirability of including Euclid as a subject of study in the Lower Secondary curriculum of studies.

9. In conclusion I am of humble opinion that the Senate's action in this respect is revolutionary and harmful. The Senate has accepted the recommendations of the committee presided over by Mr. Allen. Under these circumstances I beg of His Excellency the Governor in Council to withhold assent to this part of the Senate's proposal since the regulations as forwarded by the Senate are merely recommendations, which His Excellency's Government are not bound to accept.

ENCLOSURES.

(1)

Circular letter of the Joint Secretary to the Council of Native Education to the Headmasters of High Schools, dated 12th June 1906.

I beg to bring to your kind notice the fact that it was resolved at a meeting of the Council of Native Education to invite the opinions of the Headmasters of High schools and other gentlemen interested in education with reference to the recommendation of the Senate of the Madras University that Geometry “Practical and Theoretical” be substituted for Euclid.

I enclose for your kind acceptance a pamphlet "On Geometry Teaching in this Presidency". It may be noticed that

- (1) No substitute for Euclid has been found in England after 30 years' agitation.
- (2) Some of the books that have recently been published with the object of providing such a substitute however suitable they may be for Art and Technical schools are unsuitable for ordinary schools.
- (3) For the Oxford, Cambridge, Dublin, Aberdeen and even for the London University examinations, Euclid continues to be the basis of instruction in Elementary Geometry.
- (4) Even for the preliminary examination conducted by the Madras Civil Engineering College recently, Euclid was the examination text-book.
- (5) Euclid was an extremely popular subject with Lower Secondary candidates as an optional subject before the prohibition of its teaching in 1902.
- (6) The Syllabus issued by the Bombay University under the new University Act contains nothing which any decent text-book of Euclid does not contain; on the contrary it contains much less.
- (7) Practical Geometry will no doubt train the hand and the eye but it is much more suitable for the Lower Secondary classes.
- (8) The numerous failures in the Matriculation examination in Science for many years and in History and Geography during recent years are largely due to want of definiteness in the scope and extent of the curriculum in those subjects. The proposed change in Geometry teaching will introduce a similar indefiniteness and may be responsible for further failures.

As it is intended to submit a memorial to Government on the subject I shall be obliged by your favouring me early with an indication of your views, on the enclosed post card, to enable me to place the same before the Council of Native Education.

(2)

Circular letter of the Joint Secretary to the Council of Native Education to the Headmasters of High Schools, dated 26th November 1906.

I beg to send for your kind acceptance a reprint of my letter, dated 12th June 1906, re "Matriculation Geometry" and also a copy of the replies I have received from the Headmasters and other gentlemen to whom my thanks are due for their kindness in sending replies. I have further to add in this connection that Euclid should be the basis of instruction in Theoretical Geometry.

(1) It is evident from the replies above referred to that whatever be the conditions in Germany and in France which must have rendered necessary some substitute for Euclid, this country is not prepared for such a change at present.

(2) Nobody desires Euclid to be taught with all its faults. Improved methods of teaching may be adopted even in Euclid. Euclid is not studied merely for the one hundred propositions of the first three books. Numerous intelligent exercises are and should be framed on their basis. The present day publications Tom's Geometry, Bill's Geometry, and Fox's Geometry have yet to establish a name.

(3) The antipathy to Euclid would disappear if the teaching of the subject is entrusted to competent masters.

(4) It is a subject in which any attempt at cramming may easily be detected.

(5) It is the only subject which will develop the reasoning faculties of children.

(6) There is no objection to Practical Geometry, but each is good in its own way. Practical Geometry and Theoretical Geometry should not be combined. Practical Geometry should be learnt by pupils in Technical schools and Theoretical Geometry by pupils preparing for an University course. If it is thought necessary Practical Geometry may be made optional with Theoretical Geometry.

(7) Curiously enough Euclid continues to be the basis of instruction for boys in European schools. The Educational Department apparently does not view the Senate's revolutionary changes with great favour.

(8) The effective teaching of Practical Geometry is impossible with our large classes.

(9) Our teachers themselves are many of them not familiar with the subject. It is essential that the foundations of the subject ought to be laid by competent hands.

I request the favour of your opinion at an early date before addressing Government on this subject.

(3)

Replies from the Headmasters of High Schools and other educators to the circular letter of the Council of Native Education regarding the Teaching of Geometry in High Schools.

Against the Senate's Proposals.

I am decidedly in favour of the retention of Euclid, as the University Examiners, I am informed by the Registrar, accept all valid proofs in the alternative. Practical Geometry need not and should not be taught in an Arts course as for the Matriculation examination. It should be taught and is taught in my school and many other schools, only in the Lower Secondary classes.

17th July 1906.

G. MUKUNDA RAO,
Headmaster, Municipal High School, Chicacole.

2. I must heartily endorse every one of your convincing arguments against the Senate's proposal for the substitution of Theoretical and Practical Geometry in the place of Euclidian Geometry now in use. The 8th para. of your circular letter is especially irrefutable and must make every Headmaster pause before he adopts the very suicidal step of raising his voice in support of the Senate's proposal. Let there be beneficial changes in subjects in which there is a crying demand for them. There has been no complaint worth the name as regards the curriculum or the questions of the Matriculation Mathematics. English and general knowledge are badly in need of changes, especially the latter. The Senate had better leave mathematics alone and effect all possible improvements in English and general knowledge. Even if the Mathematical changes newly introduced into the school curricula of England could be called improvements, we might say there is yet time enough for such changes here. Let the times demand the changes. Then the changes would be welcome.

8th September 1906.

V. RAMALINGASWAMI, B.A.,
Headmaster, Maharaja's High School, Bobbili.

3. In reply to your circular letter I am of opinion that the first three Books of Euclid's Elements should be continued for the Matriculation examination, and that all practical work in Geometry, which is contemplated in the Senate's Resolution and which is absolutely necessary, should be confined to the three Books of Euclid.

21st July 1906.

T. V. SRINIVASA AIYAR,
Headmaster, Board High School, Amalapuram.

4. As no suitable substitute for Euclid has yet been found and as the subject Geometry "Practical and Theoretical" may lead to disastrous failures in the examination for want of definiteness in its scope, I am in favour of retaining Euclid in the Matriculation curriculum. Practical Geometry, as it trains the hand and the eye, may, with advantage, be introduced in the Third and the Fourth Forms.

14th August 1906.

I. GANAPATI RAO, First Assistant,
for Headmaster, Taylor's High School, Narsapur.

5. Practical Geometry may be taught with advantage to the Lower Secondary Forms. Euclid should be retained in the curriculum for the Matriculation examination.

15th July 1906.

M. S. RAMA RAO,
Headmaster, A.E.L.M. High School, Peddapur.

6. With reference to your card of 5th instant I wish to say that I have not been in receipt of the circular letter referred to therein. If the matter about which my opinion has been required be about the necessity of teaching Geometry to the Lower Secondary Form, I should say that it is both desirable and expedient to teach Geometry and Algebra in the Third Form.

15th September 1906.

M. S. RAMA RAO,
Headmaster, A.E.L.M. High School, Peddapur.

7. Euclid's Elements of Geometry has answered all the purposes of education in Geometry all these years, and I see no reason why it should be given up now, and the subject left in an indefinite way. In the Edinburgh University Euclid is still the basis of Geometrical instruction.

18th July 1906.

D. ANANTAN,
Headmaster, C.M.S. High School, Bezawada.

6. I am *against* any change in the method of Geometrical teaching. The present suggestion is *vague*; and Euclid's Geometry is still used in English and Scotch Universities.

7th September 1906.

D. ANANTAN,
Headmaster, C.M.S. High School, Bezvada.

7. I consider that Euclid should be retained for the Matriculation examination, because there is no book better adapted for mental training.

7th September 1906.

WILLIAM PENN,
Principal, Noble College, Masulipatam.

8. In my humble opinion the introduction of Practical Geometry into the Matriculation curriculum does not better the condition of the pupils. Practical Geometry, while giving a good training to the eye and the hand does very little by way of developing the intellect and the reasoning faculty of the student. The High schools, as they are manned now, have not many teachers who can do justice to the new subject if entrusted to them. As you say, under the proposed new curriculum, the examination in Geometry too will become vague and indefinite which is not a thing to be desired. Practical Geometry may, however, be introduced in the Lower Secondary classes with some advantage to supplement the drawing work.

17th July 1906.

Headmaster, R. Ch. High School, Pithapuram.

9. I am for retaining Euclid in the Matriculation curriculum. If Geometry, Practical and Theoretical, were not to be substituted for Euclid, there is no doubt that it will be indefinite in its scope and thereby bring about further failures in Mathematics.

10th August 1906.

W. RAMACHANDRA AIYAR,
Headmaster, R.V.M. High School, Venkatagiri Town.

10. I have the honour to state that I am far from thinking that the replacement of Euclid by Geometry will serve any useful purpose and that it will be advisable to retain Euclid while enforcing greater attention to the practical side of it, viz., drawing Geometrical figures.

Headmaster, Board High School, Bapatla.

11. I agree with you in thinking that Practical Geometry will do for the Lower Secondary class but Euclid's Elements are the best for the Upper Secondary department.

14th August 1906.

KOLANDAVELU,
Headmaster, A.B.M. High School, Nellore.

12. I am not in favour of the recommendation of the Senate of the Madras University to substitute Practical and Theoretical Geometry for Euclid.

2nd August 1906.

T. T. KRISHNA AIYAR,
Headmaster, Town High School, Guntur.

13. I am in entire accord with the views of the Council as regards the difficulty of substituting Practical and Theoretical Geometry for Euclid and the desirability of retaining the latter as a subject of instruction for the Matriculation class. The vagueness and indefiniteness of the subject, not to speak of the inferiority of its educational value, will prove a great stumbling block to both masters and pupils and I am strongly opposed to the introduction into the curriculum of studies of anything that will place us at the mercy of chance.

21st July 1906.

S. MUTHU AIYAR,
Headmaster, Hindu High School, Masulipatam.

14. Kindly allow me to inform you that I am not in favour of the change proposed by the Senate. The substitution of Euclid by Modern Geometry, Practical and Theoretical, will bring chaos where there has been order.

15th July 1906.

K. R. RAGHUNATHA CHARI,
Headmaster, Municipal High School, Kurnool.

15. Those who are teaching Geometry in this school are, I believe, in favour of retaining Euclid and I agree with them that what has been the foundation of Geometrical teaching for so many generations is not lightly to be put aside for some new method.

8th August 1906.

R. U. POTTS,
Headmaster, S.P.G. High School, Vepery.

16. I believe that Euclid, as an intellectual developer, has no rival; and that it never can be ousted from the school curriculum without causing irreparable loss.

15th July 1906.

J. P. PRICE,
Headmaster, St. Patrick High School, Adyar.

17. 'Euclid' is intended to be taught in the school for general education mainly for the mental discipline it affords, for a habit of accurate and consecutive deductive reasoning. Any methods of teaching of the subject not calculated to train the children to this habit of thought would be unsatisfactory and there need be only a reform in the lines of Harpur's Euclid, not a revolution. If Euclid is to be replaced by any other book, there has not been a book treating of the subject, which though very much suited for Art and Technical schools, is so far suitable for schools for general education.

As for 'Practical Geometry' it is to be introduced in the ordinary school mainly to train the hand and eye and to give a habit of neatness and mechanical dexterity. The department lays so much stress on the training of the hand and eye only in the lower classes of the school and this subject may, with profit, be introduced in the Lower Secondary department. To consider the practicability of the teaching of this subject the classes need be small so as to enable the teacher to supervise the working with rulers, set square, protractors and compasses and the teacher shall be an efficient hand, himself an expert in producing good specimens. Theoretical Geometry may be taught in the High school and an examining body might retain Euclid to secure a definiteness of the subject, until a more suitable text book is available.

14th July 1906.

M. DESIKACHARI,
Headmaster, Hindu High School, Madurantakam.

18. I am not for Geometry, Practical and Theoretical, but for Euclid as it is taught now in our High schools.

8th July 1906.

P. SUBRAMANYA AIYAR,
Headmaster, W.M. High School, Trivellore.

19. I am of opinion that both Practical and Theoretical Geometry have to be taught, the former, if practicable, in the Lower Secondary classes on account of the excellent training it affords to the hand and the eye of the student and the latter on account of the valuable mental discipline it affords to the student, too valuable to be lost. Instruction in Theoretical Geometry must be on the lines of Euclid, as any other mode of teaching it is sure to result in want of uniformity, vagueness and confusion.

6th July 1906.

A. PHEEMACHAR,
Headmaster, Municipal High School, Bellary.

20. In reply to your kind note of the 12th instant, I have pleasure in saying that considering all the grounds urged for and against, in my humble opinion, it is preferable to retain Euclid as it is.

22nd July 1906.

A. S. ARUNACHALA AIYAR,
Headmaster, M.H. School, Anantapur.

21. I have the honour to state that in the absence of Geometry as a subject in the Lower Secondary classes it would be desirable to have the Elements of Practical Geometry in the Fourth Form. But should the curriculum be changed in the Lower Secondary department by the introduction of the subject the High school course need not be crowded with the same.

2nd August 1906.

S. VENKATACHARLU,
Headmaster, London Mission School, Gooty.

22. I have the honour to state that Practical Geometry may be introduced with advantage provided suitable text-books are available and sufficient time, say two years at best, is given before the change is notified to be prescribed for the Matriculation examination to enable both the pupils and the teachers to familiarise themselves with the new subject. Euclidian Geometry is not serving its purpose in the minds of the students.

19th July 1906.

Headmaster, High School, Madanapalle.

23. I believe with you that Euclid is better suited to train the logical powers of pupils than Practical Geometry, which may, however, be profitably taught in Lower Secondary classes as a preliminary.

3rd August 1906.

A. PONNAYYA,
Headmaster, A.M.L. High School, Punganuru.

24. I am at one with you in what you have pointed out in your letter of the 12th instant, about the probable consequences of the substitution of Geometry, "Practical and Theoretical," for Euclid.

2nd August 1906.

S. STEPHEN,
Headmaster, H.E.L.M. High School, Tirupati.

25. We are for Euclid rather than the proposed recommendation of the Senate of the Madras University.

We also may add that two-thirds of the marks for Euclid should be allotted to the *text of Euclid* and the remainder for deductions. It is simply shocking to read the number of failures every year in the subject. Sorry for the delay in response to your circular.

30th August 1906.

L. FORDE,
Principal, St. Joseph's High School, Coonoor.

26. We have carefully perused the pamphlet on Geometry teaching in High Schools, and we are of opinion that the present system will do more good in respect of mental training and instruction than that under contemplation. It is highly desirable that Geometrical Drawing should be carefully taught in the Lower Secondary forms so that the same students when they come up for the High School forms will be perfect in both Theoretical and Practical Geometry. Should the Euclid's elements be replaced by other treatises on the subject, it would not only create chaos and vagueness in its teaching, but would also tend to enhance the percentage of failures in Matriculation Mathematics.

17th July 1906.

K. R. RAMAKRISHNA AYYANGAR,
B.H. School, Dhārāpuram.

27. As modern Geometry will be unsuitable for Madras schools in view of its indefiniteness, I am for the retention of Euclid. Practical Geometry may be introduced in the III Form.

19th July 1906.

T. S. SUBRAMANIAM,
Headmaster, Mahajana High School, Erode.

28. The introduction of Theoretical and Practical Geometry in the Matriculation curriculum will undoubtedly cause more failures in the Matriculation examination, and will be an additional burden upon the Matriculation candidates. Euclid is a favourite subject with the Matriculation as well as Lower Secondary candidates. Any attempt to replace it will simply make the position of the unfortunate candidates miserable.

16th July 1906.

V. S. SITARAMA AYYAR,
Headmaster, Diamond Jubilee High School,
Gopichettipalayam.

29. Please accept our sincere thanks for your kind circular. This Institute is for teaching Practical Geometry in the Lower Secondary forms, and Euclid in the High School classes.

16th July 1906.

K. KRISHNASWAMI,
Headmaster, Municipal High School, Karur.

30. I am one with you in thinking that Euclid's Geometry should be taught in the High School classes and that its place in the Matriculation curriculum should not be taken by Practical Geometry.

8th August 1906.

M. SUNDARAM, B.A.,
Headmaster, L.M. High School, Salem.

31. I heartily thank you for your kind communications. I request to be excused for not having replied to you earlier. I agree with you in the main though differing in a few details. As a Local Board servant I am not allowed to pass any remarks on departmental orders.

2nd August 1906.

C. R. SRINIVASA RAGAVA CHARI,
Headmaster, B.H. School, Namakkal.

32. Thank you for your circular letter and the pamphlet. My opinion briefly is this. The subject must be Geometry. Theoretical alone, a definite syllabus being prescribed on the basis of Euclid, Books I-IV. The Lower Secondary forms may have some grounding in the elementary principles of Practical Geometry. Any how Geometry, Practical and Theoretical, is very vague.

11th August 1906.

S. NARAYANASAMI,
Headmaster, High School, Māyavaram.

33. I am of opinion that Geometry should be taught without any material departures (I do not speak of corrections or extensions and developments) from the plan laid down by Euclid.

17th July 1906.

S. RADHAKRISHNA AYYAR, B.A.,
Principal, Pudukkōttai.

34. Euclid must remain the basis of Geometry teaching. A suitable substitute has yet to appear and may not appear. Practical Geometry in the IV Form and Euclidian Geometry in the V and VI Forms will serve all purposes. The proposed change as regards Matriculation Geometry will assuredly introduce indefiniteness as to the scope of study and will certainly be responsible for many failures in the Matriculation examination. The Anti-Euclid Geometricians think Euclid's propositions cannot be taught analytically.

15th July 1906.

N. S. VENKATARAMA AYYAR, M.A., L.T.,
Headmaster, N.H. School, Mannārgudi.

35. I am not in favour of the Senate's proposal to introduce Geometry instead of Euclid in the Matriculation course.

3rd August 1906.

R. SMAILES,
Principal, Findlay College, Mannārgudi.

36. The excision of Euclid or Theoretical Geometry from the Matriculation curriculum will be a calamitous blunder. Practical Geometry is a technical subject and may stock the memory with useful formulas and rules which the pupil need not prove to himself by systematic reasoning. It can never be a substitute for Euclid which aims at giving that training to the mind which would be serviceable in the logical study of every other subject. I am sure that a number of the men in our country who have been esteemed for their cultured intelligence are greatly indebted to Euclid. A generation with minds not trained in the Euclidian method will be intellectually inferior to one which had that training. Gopala Row, Runganada Mudaliar, Mr. R. V. Srinivasa Aiyar, the late Diwan Bahadur Srinivasa Raghaviengar and a great many others have owed their intellectual power in no small degree to their study of Euclid. If they had studied only Practical Geometry, it would not have done them so much good.

21st July 1906.

S. KRISHNASAMI AYYAR,
Headmaster, N.H.S., Negapatam.

37. In reply to your circular I have the honour to inform you that we (the staff of my school) fully agree with you in the matter of Geometry teaching. Since no standard authority exists in Modern Geometry we consider the attempt to replace Euclid as premature. Modern Geometry or Practical Geometry may be taught in the lower classes up to the IV Form. In teaching Euclid modern methods of proof may be used, but Euclid's order must be observed.

3rd August 1906.

G. SHIVA RAU,
Headmaster, Lutheran Mission Central High
School, Shiyali.

38. Euclid teaches a man whether a conclusion follows from the premises given. Its value as a mental discipline is incalculable. Practical Geometry, if it does not contain much of Euclid, is an inferior substitute; if it does, is a superfluous luxury.

5th August 1906.

MUTHUKUMARAN,
Professor of Mathematics, St. Peter's College, Tanjore.

39. Adverting to the circular letter of the Council of Native Education regarding Geometry Teaching, dated the 12th June 1906, I have to state that I am not in favour of the changes proposed.

9th September 1906.

T. RAMA AIYAR,
Headmaster, Central High School, Tiruvadi.

40. In reply to your circular, dated 12th June 1906, I beg to state that the present curriculum in Geometry be retained. If the recommendations of the Senate should, however, be approved by the Government, suitable text-books may be requested to be introduced, so as to avoid the want of definiteness in the scope and extent of the curriculum.

17th July 1906.

L. S. NATARAJA SARMA,
Headmaster, Board High School, Lalgudi.

41. My view on your pamphlet on the "Geometry Teaching in this Presidency" is—that Euclid should be retained for Theoretical Geometry for reasons pointed out by you.

Practical Geometry of Euclid's problems and problematic riders are to be entrusted to the care of efficient "Drawing Masters" in the High School classes.

3rd August 1906.

G. SESHAIYANGAR,
Headmaster, National High School, Trichinopoly.

42. I find the opinion of my masters is that Geometry should be retained. I am not a Mathematician and cannot give an independent verdict on this subject.

19th July 1906.

H. PAKENHAM WELSH,
Manager, S.P.G. High School, Trichinopoly.

43. I am for the reintroduction of Euclid's elements which, I believe, is the best means of securing the educational value of Geometry. As suggested in your pamphlet, the boys should undergo some training in Practical Geometry in the Lower forms in connection with drawing, which will make them understand Euclid better. A little bit of Mensuration may be taught every now and then so as to give the subject a practical turn.

13th August 1906.

N. GANAPATI SUBBA AIYAR,
Professor of Mathematics, S.P.G. College, Trichinopoly.

44. I had a discussion with my assistants who are experienced Mathematics Graduates on the proposed change in Geometry Teaching. They are at one with me in thinking that, until a suitable substitute can be found, Euclid must continue to be the basis of instruction in Geometry, with a view to secure uniformity in teaching it and to avoid indefiniteness in the curriculum in that subject.

2nd August 1906.

T. VENKOBACHARI,
Principal, The Madura College, Madura.

45. I am of opinion that the present system of having a text-book for Geometry such as Euclid is preferable.

9th August 1906.

T. R. KRISHNAMACHARI,
Headmaster, Sourashtra High School, Madura.

46. If Euclid continues to be the basis of instruction in Elementary Geometry as you say for the Oxford, Cambridge, Dublin, Aberdeen and even for London University Examinations, I think it should be so for Madras also.

17th July 1906.

AMBROSE V. THOMAS,
Headmaster, C.M.S. High School, Mengnanapuram.

47. As has been clearly shown in your pamphlet, Practical Geometry is not practicable for instruction and examination purposes, while its disciplinary value is much inferior to Euclid. I am of opinion that the retention of Euclid in the Matriculation curriculum is desirable.

10th August 1906.

MARTIN LUTHER,
Headmaster, C.M.S. High School, Palamcottah.

48. I fully concur in your view that Euclid should form part of secondary education. As you suggest, Practical Geometry may be advantageously taught in the Lower Secondary department. The educative value of Euclid in developing the reasoning faculty cannot be too strongly dwelt upon.

19th July 1906.

T. R. RANGASWAMI,
Headmaster, Hindu High School, Srivilliputtur.

49. Geometry should be taught in High School classes mainly on the plan of Euclid. But the students must be taught "Practical Geometry" elementary parts in the Lower Secondary classes.

10th August 1906.

P. SITARAMA AIYAR,
Professor of Mathematics, Hindu College, Tinnevely.

50. To do away with a subject whose intellectual value has been tried and known for these so many years in favour of another which, even supposing for the sake of argument, can at best only equal, it is, in my humble opinion, not a wise policy. If, as alleged, boys are unable to grasp the subject, an improved method should be adopted in schools and not the subject excised from the curriculum. Euclid can safely be continued as now in the IV Form.

19th July 1906.

G. SATYAGIRIRAJAN,
Headmaster, St. Francis Xavier's High School.

51. I have gone through your pamphlet on "Geometry Teaching in this Presidency" and am strongly of opinion that Practical Geometry should be taught in the Lower Secondary classes by a competent qualified Drawing Master and that Theoretical Geometry should be taught in the High School forms by a very efficient and successful Mathematics Master, taking keen interest in his work and the improvement of his boys in Geometry with the sympathy and enthusiasm of the late W. A. Porter of Kumbakonam in the seventies.

9th September 1906.

RAMAKRISHNA AIYAR,
Headmaster, Raja's High School, Ettayapuram.

52. I have great pleasure to endorse your views and strongly protest against the introduction of Practical Geometry in the place of Euclid.

23rd July 1906.

M. PARAMESWARAN,
Headmaster, Native High School, Palghat.

53. Your letter and the pamphlet on "Geometry Teaching in this Presidency". The latter was put in the hands of my First Assistant who teaches Mathematics to the Matriculation class. He and I are both decidedly of opinion that the substitution of Geometry "Practical and Theoretical" for Euclid cannot be expected to be attended with satisfactory results and that the retention of Euclid is from nearly all points of view highly desirable.

24th July 1906.

T. K. RAMAN,
Headmaster, B.G.M. High School, Tellicherry.

54. From long observation and educational experience, I can say that Geometry ought to be taught in the High School classes for the training it gives in accurate and consecutive thinking. This view has been supported by Lord Ampthill in His Excellency's convocation address. Such training is given by Euclid, not by the recent publications intended as substitutes. A careful study of these publications enables me to say with DeMorgan "There never has been, and till we see it we never shall believe there can be, a system of Geometry worthy of the name, which has any material departures (we do not speak of corrections or extensions or developments) from the plan laid down by Euclid". No doubt, some of Euclid's proofs can be simplified and some are inaccurate. Students ought to be, and in good schools are, trained to point out these and suggest better proofs.

2. In the High School course, there are more subjects than one that train the pupils in inductive reasoning, but we have only Mathematics for this discipline in deductive reasoning. Eliminate this discipline, and the best Geometrical constructions will only swell the bulk of the stuff now crammed into the pupils' little heads.

26th July 1906.

B. RAGHUNATHA RAU,
Headmaster, Board High School, Coondapoor.

55. Euclid's Elements must be retained as the text-book for teaching Geometry in the IV, V and VI Forms in preference to any other Geometry. The course in Practical Geometry must be continued in the IV and V Forms.

14th September 1906.

C. NARAYANASWAMI AIYAR,
Headmaster, Setupati High School, Madura.

56.* I am in full sympathy with the benevolent efforts of the Council of Native Education, though on the particular question set forward I desire to reserve my opinion.

5th August 1906.

C. R. SAMUEL,
Headmaster, S.P.G. High School, Nandyal.

57. Geometry may be taught in early years. Mrs. Courtwright sets children to draw circles with the free hand which they acquire gradually. Herbert Spencer says children have a fancy for figures. Nature exhibits neat figures in every object. It is only the method that has to be changed. If drawing is systematically taught in the manner now arranged and if modern methods are adopted in teaching Geometry I should have no objection to Euclid being taught in early years.

MYLAPUR,
14th July 1906.

T. R. RAMANATHA AIYAR, B.A., L.T.

58. I should welcome the re-introduction of Geometry in the III Form, provided a fair proportion of the course in History and Geography is cut off from the Lower Secondary curriculum.

27th October 1906.

V. R. VENKATESWARA AIYAR, M.A., L.T.
Headmaster, High School, Kumbakonam.

In favour of the Senate's proposal.

1. On the whole I am for the proposed change. But I am afraid we shall have to employ specially trained men for the work of teaching Geometry intelligently and practically. Geometrical Drawing should be introduced.

2. A book like that of Professor Hanumanta Rao's excellent Geometry must be made a parallel course of study to the theoretical one.

2nd August 1906.

T. V. SWAMINATHA AIYAR,
Headmaster, W.M. High School, Triplicane.

2. In reply to your post card of the 30th July 1906, I beg to state that I am in favour of the Senate's proposal.

2nd August 1906.

D. A. HOBDAV,
Principal, Govt. Madrasa-i-Azam.

3. As regards your letter, dated the 5th instant, I beg to inform you that I am in favour of the Senate's proposals as regards Geometry Teaching as I think it will infuse new life into Geometry as it will be taught practically.

6th September 1906.

DANIEL G. MOSES,
Headmaster, U.F.C.M. High School, Chingleput.

4. As my views are also against this proposal, I kept quiet; but since you press me to give an answer, I am sorry I have to say 'Nay' to the proposal.

7th September 1906.

N. PARAMASWARA AIYAR,
Headmaster, Pach. High School, Conjeevaram.

* Neutral.

5. I am in favour of the new syllabus.

12th August 1906.

S. POTHAN,
Headmaster, Staines High School, Coonoor.

6. I am satisfied with the changes in the curriculum introduced by the Senate, and do not advocate the re-introduction of the teaching of Euclid.

2nd August 1906.

SPENCER A. SHUTIE,
Principal, Salem College.

7. Please allow me to inform you that I am not at all in favour of Geometry Teaching.

3rd August 1906.

A. PERIANAYAKAM,
Headmaster, C.M.S. High School, Srivilliputtur.

8. In reply to your circular and post card I think that Euclid as formerly presented and taught tends to cram. I would gladly have any change if only to break the long reign that memorising has had. I would recommend some modern presentation of Euclidian Geometry—one of the numerous excellent books published by Macmillan.

PALAMCOTTAH,
12th August 1906.

E. WINCKLER,
Principal.

9. With reference to your pamphlet about Geometry teaching, which you were kind enough to send me I beg to state that, considering the fact that, at present only very few of the students of the Matriculation class take up a University course, it would be better to teach Geometry both practical and theoretical whether based on the system of Euclid or not.

17th July 1906.

S. RAMACHANDRAN,
Headmaster, Raja's High School, Kollangod (Palghat).

10. Many thanks for your papers about Euclid. They have not been forwarded to me from Mangalore, but I expect to find them on my return there.

2. I am afraid I am badly in need of conversion, for I regard Euclid as an excellent lesson in logic but the worst text-book of Geometry for beginners that could be devised.

OOTACAMUND,
30th April 1906.

H. MALIM,
Principal.

11. I am of opinion that 75 per cent. of our students derive no benefit from the study of Euclid. I think it the worst possible text book for a beginner though it might usefully be given to students who have passed the B.A. (or perhaps the F.A.) examination. I certainly think that a change should be made.

24th July 1906.

H. MALIM,
Principal, Govt. College, Mangalore.

(4)

Geometry Teaching in this Presidency.

In considering whether Euclid should be "excised" from the curriculum for the Matriculation examination, modern Elementary Geometry being substituted for it or whether Euclid should be retained, the following considerations should be kept in mind:—

- (1) The past history of the subject as studied in our schools.
- (2) The practicability of introducing Elementary Geometry (a) viewed in the light of the experience gathered from the introduction of the reform in England, (b) from the point of view of its suitability to our conditions, teachers and students, (c) specially from the point of view of facility of examination.
- (3) What may be called the merits of the question. The relative advantages and disadvantages of Euclid as compared with the proposed Geometry considered with reference to their value (a) from point of information they give (b) of their value as agents of mental discipline.

2. During the last thirty years Euclid has been a part of the Lower Secondary and High School curriculum of studies. Euclid's Elements of Geometry, Book I, was practically a compulsory subject for the Lower Secondary examination under Mr. Grigg's scheme and as such it was taught in all ordinary schools. Latterly it was taught as an optional subject and continued in

the curriculum from 1879 to 1899. The subject was removed from the curriculum of studies by a notification issued by the Director of Public Instruction in November 1900. This removal was the result of the recommendation of the Educational Conference of 1899. Previous to the Conference there was a general dissatisfaction amongst teachers and managers with the state of Lower Secondary education and though, as the invited opinions suggested, various other important reasons might legitimately have been held to account for the unsatisfactory state of things still the Director of Public Instruction on the representation of a few educationists who were guided by the Headmasters of High Schools and who in their turn were guided by the Third Form Masters who thought that one subject removed from the curriculum would be more convenient to themselves and to their boys, removed the subject from the curriculum of studies. This Conference was held in December 1899. The Government notification approving of this removal appeared in November of the following year 1900. Even those Managers who voted for the removal of the subject continued to teach the subject in their respective schools. Then the Managers requested the Director of Public Instruction to restore Euclid and Algebra to their old places in the curriculum. The Director acceded to their request by a notice dated 28th February 1901. Then the Director prohibited the teaching of the subject in the Lower Secondary classes although it was a subject for the Lower Secondary examination.

3. The following facts may be adduced to show that Euclid's Elements was a favourite optional subject with the boys:—

(1) The Government Orders recording the annual reports of the Government examinations contained the following "Geometry and Algebra among males and Needle work among females continued to be the most popular of the optional subjects."

(2) The following figures show the number of candidates that took up the subject as an optional subject:—

	E. Science.	History of England.	Geometry and Algebra.
1897	297	438	7,561
1898	547	499	9,147
1899	425	481	8,642
1900	} Figures not available.	}	}
1901			
1902			
	247	268	3,244

4. As a result of the discussion of a meeting in 1902 the Madras Teachers' Guild invited the opinions of the Headmasters of High schools on the subject. Out of 28 replies received in answer, 17 were against and 11 were in favour of retaining Euclid and seeing that the Teachers' Guild did not move in the matter a year later, I sent a similar query with a covering letter in which I explained my reasons against the prohibition. I discussed in that circular the existing Lower Secondary curriculum of studies. The paper was shortly the following:—

(1) Unsuitable courses of study, a fault of the system of education in the lower classes. English the medium of instruction and the overdominance of History and Geography.

(2) Consequent reduction in the number of subjects taught from six to three.

(3) Euclid's Elements practically compulsory in 1879. Euclid's Elements continuously taught from then till 1899. Though "removed" in 1900, the subject continued to be taught till its teaching was prohibited in 1902.

(4) The question considered with reference to various classes of institutions.

(5) Negative justification for the retention of Geometry. If Geometry is to be removed, History of Great Britain and Ireland or Elementary Science possible substitutes. The former encourages further cram, the latter impracticable for want of qualified teachers.

(6) Positive justification. Geometry a necessary element of education as a means of intellectual discipline.

(7) The form in which Geometry is to be taught.

Positive justification for retaining Euclid. The mental discipline afforded by reasoned Geometry.

Negative justification. No definite result arrived in England after thirty years' agitation to substitute any workable syllabus instead of Euclid.

5. Out of 85 replies received, twice as many as those received by the Teachers' Guild, namely, 55 or nearly two-thirds were in favour of the reintroduction of Euclid as against 27 or about one-third were against it. Three were neutral. The Headmasters of Local and Municipal schools were not consulted, as they were prevented from giving opinions by virtue of their official position. Thus, finding that 2 out of 3 headmasters were in favour of approaching the Director with a request to remove the prohibition, I arranged in April 1903 with the Secretaries of the Madras Teachers' Guild to open a discussion on the desirability of requesting the Director to remove the prohibition of the teaching of Euclid. Unfortunately no resolution could be arrived at in pursuance of the discussion since the attendance was poor.

The question was again discussed at the annual Conference of the Madras Teachers' Guild, December 1903. No discussion followed and no resolution was adopted.

6. Hasty and ill-considered changes made in Mr. Grigg's scheme have disorganized the education in the Lower secondary classes, and as a consequence boys enter High school classes with deficient training. The effect of lowering of the standard is that the impressionable period of the boys in the lower classes is wasted without a sufficient grounding in easy subjects. Therefore it is imperative on us to note carefully the observation made by Dr. Gurudass Banerji in connection with the University Degrees that it is to our interest to see that the policy of lowering the standard is one which defeats itself and that our standard should be set high if our education is to be of any value.

7. The faults of bad teaching have been attributed to the subject itself and thus it has been rendered unpopular. Some persons in England, impressed with these faults, have tried to do away with Euclid altogether and to introduce various syllabuses of their own which in their opinion are more suitable for purposes of teaching. But there are others who hold, and, I think rightly hold, that change, not revolution, is what is required. The weighty authority of the British Association Committee on the teaching of mathematics is with us to some extent; they say "an examining body might retain Euclid to the extent of requiring his logical order" (*School World*, October 1902). We may note that similar opinions were embodied in the reports made in 1873 and in 1876, "on the possibility of improving the methods of instruction in Elementary Geometry." Among the many grounds which may be urged in favour of the retention of Euclid as the basis of Geometrical teaching, we must remember that for purposes of examination it is necessary that there should be some common standard. It is futile to disregard this fact; if even in England teaching is guided largely by the requirements of examinations, it is still more so in India. Uniformity in the teaching of Geometry is essential if we would avoid being landed in a disastrous muddle by a lack of cohesion. "Euclid is an excellent standard for work and examination and if it were abolished confusion would be the result." This fact has been intuitively recognized so that Euclid has continued to be the basis of Geometrical teaching; and reformers merely tilt against an imaginary windmill when they remark that Euclid's fame is no argument against reform. "After two thousand years Aristotle was abandoned as a preceptor in Natural Science. Boyle and Black, Davy and Faraday have cut us adrift for ever from the philosophy of the great stagyrite." The question naturally arises why has not Euclid been similarly "abandoned." The writer of the words above quoted lays the blame on fortune—an unsatisfactory answer. The truth is that Euclid taught "a science unchangeable in its principles as human reason"—a science which has never had to take a foot-step backwards, which has never asserted without proof, nor retracted a proved assertion.

8. The faulty methods in teaching Euclid have been pointed out and they are very few and they all find place in recent editions—

"There is no subject perhaps in our school curriculum which quite apart from all consideration of examination needs furnishes greater educational advantages than does the teaching of Euclid and the exercises of Geometrical deduction", says a writer in the *School World*, March 1903, writing about the recent agitation in England to abolish Euclid as the basis of Geometrical teaching. As there seems to be some misapprehension as to the nature of that agitation, we shall briefly set out the results of the discussion on the Teaching of Mathematics at the British Association meeting held at Glasgow, 1901. Out of the 18 speakers who took part in that discussion, I find that of the 11 who refer to the subject of Euclid, no less than 6 (five expressly and one impliedly) were in favour of retaining Euclid. One (Professor Everett) was apparently neutral. Only four were against Euclid. Again written replies to Professor Perry's queries are anything but uniformly favourable to Euclid's rival. I take the following extracts from the book entitled:—"British Association Meeting at Glasgow, 1901. Discussion on the Teaching of Mathematics—edited by John Perry." Sir Philip Magnus wrote: "But if the aim of mathematical teaching is rather brain development, accuracy in calculation and in measurement, the acquisition of correct methods of reasoning or even a training that helps discovery, then I am not sure that Professor Perry's 'royal road' is altogether a safe one for ordinary children So for the purposes of general education a boy cannot be said to be learning mathematics by merely acquiring dexterity in the use of mathematical tables. I do not think Professor Perry meant all he said It must not be forgotten however that the process of teaching a child to discover is not a rapid method of arriving at results and may tend to retard rather than quicken progress as measured by worked chapters of our School Text Books." No doubt differing from Professor Perry in his proposals, he is himself against Euclid. Again several of the replies apply to the difficulty of obtaining proper teachers to follow the proposed course. Dr. J. Larmor writes in the following way: "The difficulty in regard to them (Professor Perry's proposals) is a practical one, there is the question of expense: to carry out such a proposal involves small classes and much individual attention to dull pupils, whereas the present more routine methods have been evolved largely in order to enable a single teacher to supervise a large class. There is the difficulty of obtaining a sufficient supply of elementary teachers who could be trusted to pursue a more unfettered course without exaggeration or wrong headedness." [Page 69.]

W. P. Workman says, "I am not clear that it (the proposed reform) lays sufficient stress on the training in exact thought which our present system certainly supplies, though possibly, probably even, at excessive cost in time" He further observes "a good

mathematician may be trusted to teach according to Professor Perry's proposals, and to get more out of it than he did from the older, because it will evoke far more interest. An indifferent mathematician would do much harm, because so much is left to his own badly trained initiative." [Pages 76, 77.]

W. D. Eggar writes: "I feel that some of your proposed innovations might lead to disaster in the hands of a teacher not fully gifted with judgment." [Page 80.]

9. If this is so in England how much greater the difficulty must be of finding suitable teachers here scarcely needs pointing out. As Professor Horace Lamb said: "A good text-book to replace Euclid is much wanted . . . also it should be Euclidian in method if not in phraseology. If anything else is attempted a disastrous muddle will ensue to be followed after few years by a reversion to Euclid as happened once, I think, in Italy. I have little to say on the subject of the syllabus, except that, as a rule, I object to all programmes, and schedules, and "courses." A's "system" of teaching Chemistry, B's "system" of teaching Drawing or C's "system" of teaching the Piano, may be very good as a method elaborated by A, or B, or C, for doing his own work; but in other hands it is likely to become as mechanical and wooden as any other." [Page 92.]

Nor is evidence wanting that the abolition of Euclid has not been followed by any improvement in the instruction imparted. As says an American Professor, "with regard to these hasty ways that sweep over the country, in mathematical teaching, one of them was one that appeared a few years ago on Heuristic Geometry. We do not hear so much about that now. The enthusiasts thought they had solved the trouble with the Geometry of the secondary schools by making an entirely new invention. I went to visit a school on purpose, in a friendly spirit to be sure—to see how the thing worked, with one of the most enthusiastic teachers in New England. He claimed it was wrong that the children should take their ideas second-hand—that they should find them all for themselves. I think I state the matter fairly when I say that of a class of eighteen, ten boys and eight girls, there were four boys and two girls doing all the thinking, and the other twelve of the eighteen took their ideas entirely second-hand from the six. I watched the faces of the slower members of the class when a new question arose. They never thought of thinking about the thing, but waited to see what the others thought. I think that is a fair representation of the thing." (School Review December 1903, University of Chicago Press.) [Page 813.]

10. I have thought it proper to quote this long extract to show how the "Heuristic" method of teaching Geometry (which some educationists wish to be introduced into this country) is working in other countries.

11. And again "in making substitution for the Geometry which we teach now, I have no agreement with the gentleman who spoke last evening, that there is very little educational value in Demonstrational Geometry, and I feel sure that most of you teachers in Geometry, have not. We must bear in mind this thing that when we substitute various things, like mechanical Drawing and so on, for that kind of Geometry, we substitute a thing which is by no means equal in the present stages of the work. It may be equal one of these days, but it is not now. Some of the most hopeless boys I have in Geometry are boys who have had two years, perhaps, in Mechanical Drawing in various schools, and have done the drawing well, but it has given them no idea of Geometrical forms" (School Review December 1903, University of Chicago Press.) [Page 815.]

12. After thirty years agitation to abolish Euclid and substitute a suitable text book in its stead what is the result in England? As has been pointed out by Mr. Rupert Deakin, M.A., it is erroneous to suppose that Euclid is no longer used in England. "Coming now to the Theoretical Geometry, I think that the idea that Euclid is no longer to be taught or used as a text book for the Cambridge Locals is quite erroneous. In the first place the Schedule distinctly says that the substance of certain theorems in Euclid must be known. Euclid's problems are replaced by Geometrical Drawing; but most of Euclid's theorems are retained, and more riders based on these theorems will probably be set. As a proof that Euclid is not to be abolished, the fact that the Pitt Press edition of Euclid is recommended by the Cambridge authorities as a text book may be mentioned. Teachers may rely on the Pitt Press Euclid, together with a book on Geometrical Drawing, as providing excellent preparation for the examinations. Again, in the specimen papers recently published, no less than five of Euclid's theorems are set both in the preliminary and in the junior paper. With regard to the omission of Euclid's problems, it is noticeable that the junior paper of 1901 contained none of Euclid's problems. The intention seems to be not so much to abolish Euclid as to ensure that Euclid shall be taught in a more intelligent and practical way." (School World, April 1903). The same writer concludes the article by giving his advice to those teachers who have been working out courses of Geometry for their own classes. To all such he says "Do not change your system for the Cambridge Locals or any other examination. Modify and improve your teaching by reading these new books in order to get new ideas. Reformation, not revolution, is needed; a good teacher can appreciate good methods, and should be ready to adopt them even when he himself does not originate them (School World, April 1903). In the course of the correspondence which recently appeared in the columns of the *Madras Mail* on the "Teaching of Mathematics" Mr. Weir, Professor of Mathematics, Maharaja's College, Mysore, who was pleading for the cause of reform had to admit "whether a simple change in the method of teaching Geometry will do all that the reformers claim for it in producing a habit of accurate and consecutive thinking is another matter on which a pessimist may be

allowed to express a pious doubt." On the face of the evidence above set out it requires but little pessimism to express that doubt. As I then pointed though suggestions for reforms in our present methods of Geometrical teaching might be derived from those put forward by the reformers in England, it would be impracticable to adopt them *in toto* planned as they are (the reformers' courses) for a totally different set of circumstances; they would not be suitable here. Moreover I pointed out in criticising a particular text book drawn up on some of the proposed lines of reform "a truth which has recently been lost sight of, even among the educationists (who ought surely to be better informed) is, that Geometry is, or ought to be, taught in the lower classes mainly for the mental discipline it affords—a fact which has been forcibly impressed upon us by His Excellency Lord Amthill, in the course of his Convocation address for the habit it tends to produce of accurate and consecutive reasoning. Any methods of teaching, therefore, which rob the subject of this disciplinary value must be condemned as unsatisfactory . . . If we are to reform at all, the methods of reform we adopt must be the outcome of our own experience, of our successes and failures in the past, and must necessarily be controlled by our ability to carry them out, however desirable in themselves they might be." In the course of the *Madras Mail* correspondence Mr. Weir pointed out that Baker and Bourne and Eggar's books are the most suitable books. Baker and Bourne is no doubt a conservative book. If Baker and Bourne will suit the modern requirements the following books will also suit—Harper's Euclid, Taylor's Euclid, Laying's Euclid, Mackay's Euclid. But Eggar's book is one of the reformers' method. This book is considered not only by Mr. Weir and also by the *Longman's Magazine* as the most suitable to take the place of Euclid in our ordinary schools. I have examined how far Eggar's *Practical Exercises in Geometry* is suited to our schools. I do not think that it can be recommended as a text book for use in our schools, for in the first place the book attempts at once too much and too little. The first ten chapters of the book are devoted to the measurement of lengths, angles, areas and volumes. I cannot understand why Mr. Weir who is so impressed with the wastefulness, as he considers it, of the present system of teaching should recommend this book. It seems to me that all the ideas set forth in these initial chapters can be taught to pupils in the primary department. It would be mere waste of time to teach much elementary things in the High school or even in the Lower Secondary course. On the other hand chapters XXV to XXXI both inclusive treat of subjects not now taught even in the High school classes. Chapters XI to XXIV treat the properties of triangles, quadrilaterals and circles. It appears to me that it is a mistake thus to make a jumble of everything and present it to our boys instead of introducing them to an orderly and sequent system of Elementary Mathematics somewhat on the general lines of the present system. Besides these intrinsic disadvantages there is the language difficulty if the first ten chapters were to be taught in the primary department. Moreover the masters of these classes are not generally of the capacity to teach the subject matter of the book in English. I think that in the light of these remarks the book does not appear the desirable one that Mr. Weir implies it is, however suitable the book may be for an art school.

13. Again as regards the suggestion that Geometrical drawing might take the place of Geometry, the objections to such a course are too many for us to comprehensively notice here. But we may point out that besides the loss of the mental discipline incident to a course of reasoned Geometry there are the impossibility of getting competent teacher and that a teacher could efficiently supervise the work of a large class of boys. If however it is thought desirable to preface the regular study of Geometry by a practical course calculated to impress upon the youthful mind the leading notions of Geometry then such a prefatory course can well be carried out, as has been pointed out above, in the five years of the primary department.

But if as suggested by the Senate of the Madras University for the consideration of the Government, "Modern Elementary Geometry, Practical and Theoretical" is to take the place of Euclid in the Matriculation curriculum the following important questions arise for consideration:—

- (1) The exact scope and nature of the Syllabus to be adopted.
- (2) The initial practicability and chances of success of such a reform having regard to our conditions, the intelligence of our pupils, the sizes of our classes and the capacity of our teachers.

14. As regards the theoretical portion if our University should follow a course similar to the one adopted by the Bombay University recently, it is to be observed that it is only Euclid thinned, Euclid rarified. The Syllabus contains nothing which any decent Text Book of Euclid does not contain and which our youths now learn. On the contrary it contains much less, too little in fact. The warning of Dr. Gurudas Banerji to the reformers in his dissenting note to the Report of the Universities' Commission not to lower the standard is assuming a prophetic value. If this is all the "Modernized Geometry" that is to replace Euclid one may well say with DeMorgan "There never has been, and till we see it we never shall believe there can be, a system of Geometry worthy of the name, which has any material departures (we do not speak of correction or extensions or developments) from the plan laid down by Euclid."

15. The "practical" portion is much more objectionable. Not to repeat what has already been said that the substitution of a collection of constructions learnt by rule of thumb is incomparably inferior in educational value as a reasoned system and is in fact deleterious as encourage cram and weakening the sense of the force of necessary relations, it must be seen that the scheme is calculated to fail from its impracticability. How in our large High School classes of an average strength of 40 is a teacher to supervise the working of "Practical Geometry" with ruler, set

square, protractors and compasses? How can it but degenerate into a series of puzzle constructions? To propose such a scheme is to ignore one of the fundamental considerations which should influence recommendations to teach a subject in the lower classes, viz., what may be called the degenerating capacity of a subject. Again where are our teachers? I yield to none in recognizing the desirability of children attaining a grounding in Practical Geometry and this work can and ought to be done in the Lower Secondary classes. But the next question will be "Are middle aged men unaccustomed to such work now to struggle with protractor and compasses to acquire at their time of life the neatness and mechanical dexterity without which constructions in Practical Geometry would be utterly valueless?" Neatness and precision are qualities essentially learnt from practice rather than precept. A teacher who draws irregular squares, rickety triangles and elliptical circles (as without practice he of necessity must) is not the likeliest person to succeed in teaching "Practical Geometry" to his pupils. The proper solution of these difficulties is the teaching of Practical Geometry in the Lower Secondary classes and the teaching of Theoretical Geometry in the High school classes. Unless and until the Headmasters of High Schools meet in a conference to put the Lower Secondary education in order many such difficult questions like the present will remain unsolved.

16. The following is the result of the replies sent by the Headmasters of High Schools to my printed circular of February 1903, "On the desirability of including Geometry as an optional subject in the Lower Secondary curriculum of studies":—

In favour of re-introduction (55).

1. Bobbili Samasthanam High School.
2. Ellore C.M.S. High School.
3. Narasapur Taylor's High School.
4. Bezwada C.M.S. High School.
5. Guntur Sanskrit High School.
6. Masulipatam Noble College—against teaching Euclid in English.
7. Nuzvid Sri Raja's High School.*
8. Nandyal S.P.G. High School.*
9. Nellore F.C.M. High School.
10. Madras Bishop Corrie's Grammar School.
11. " Church of Scotland Mission College.
12. " Doyeton Protestant College.
13. " Pachaiyappa's College.
14. " St. Mary's College.
15. Vepery S.P.G. High School.
16. Mylapore San Thomé Seminary.
17. Royapettah Harris High School.
18. Mutyalpet High School.
19. Triplicane W.M. High School.
20. Chingleput Native High School.
21. Conjeeveram Pachaiyappa's High School.
22. Tiruvallur W.M. High School.
23. Gooty London Mission High School.
24. Madanapalle High School.
25. Tirupati H.L.G.M. High School.
26. " Sri Mahant's High School.
27. Vellore Arcot Mission College.
28. " Sri Mahant's High School.
29. Erode London Mission High School.
30. Salem London Mission High School.
31. Kumbakonam Town High School.
32. Mannargudi National High School.
33. Negapatam Wesleyan Mission High School.
34. Shiyali Lutherau Mission Central School.
35. Trichinopoly S.P.G. High School.
36. Pasumalai A.B.M. High School.
37. Ramnad S.P.G. High School.
38. Megnanapuram C.M.S. High School.
39. Pattamadai High School.
40. Palamcottah C.M.S. High School.
41. Alattur High School.
42. B. S. Lepper, Esq., M.A., F.M.U., desires that the subject should be taught in the vernaculars.
43. M.R.Ry. S. Radhakrishna Aiyar Avargal, B.A., F.M.U.
44. R. Ch. High School, Pithapuram.
45. R.B.A.M.M. High School, Bangalore.

* Would retain Euclid's Elements owing to the difficulties of selecting a suitable subject for the Lower Secondary Examination.

46. Christian High School, Udipi.
47. Stanes High School, Coonoor, the Nilgiris.
48. St. Joseph's High School, Coonoor.
49. Diamond Jubilee High School, Gobichettipalayam.
50. Adayar High School and Orphanage.
51. A.E.L. Mission High School, Peddapuram.
52. Victoria Memorial High School, Tanuku.
53. C.S. Boarding High School, Anakapalle.
54. Thondamandalam High School, Madras.
55. City High School, Madras.

Against re-introduction (26).

1. Vizagapatam Mrs. A. V. Narasinga Rau College.
2. " London Mission High School.
3. Cocanada Pithapur Raja's College.
4. Guntur A.E.L.M. College.
5. Madras Hindu Theological High School.
6. Triplicane Hindu High School.
7. Chittoor Board High School.
8. Punganur American Mission High School.
9. Erode Mahajana High School.
10. Mannargudi Wesleyan Mission High School.
11. Tiruvallur Board High School.
12. Shiyali Hindu High School.
13. Trichinopoly National High School.
14. Madura College.
15. " Setupati Town High School.
16. Srivilliputtur C.M.S. High School.
17. Mangalore B.G.M. High School.
18. R.V.M. High School, Venkatagiri Town.
19. St. Antony School, Negapatam.
20. Raja High School, Sivaganga.
21. St. Xavier's High School, Palamcottah.
22. Hindu High School, Srivilliputtur.
23. Kerala Vidhyasala, Virudupati.
24. Native High School, Palghat.
25. Brennen College, Tellicherry.
26. St. Antony's High School, Vizagapatam.

Neutral (3).

1. Triplicane Madrasa-i-Azam.
2. Conjeeveram F.C.M. High School.
3. Cochin High School.

(5)

A pamphlet on the desirability of including Euclid as a subject of study in the Lower Secondary Curriculum.

In his note of dissent to the report of the Universities Commission, Dr. Gurudas Bannerji truly observes that "the real improvement of University education must have its foundation laid in an improved system of school education," and he traces the faults of our system of education in the lower classes to (1) unsuitable text books and courses of study, (2) inefficient teaching, and (3) injudicious methods of examination.

2. We propose now to consider the system of lower secondary education prevailing in Madras in the light of these remarks, especially under the first head.

The two great faults which stand out in the scheme of study at present existing are (a) the fact that English is made the medium of instruction even from the first form upwards though it was decided to the contrary at the Educational Conference of 1899,—the objection is not against English being taught as a language subject but against its being made the medium of instruction in non-language subjects; (b) the undue prominence given to History and Geography, which are learnt in English, in the curriculum.

3. As a result while the number of subjects taught has been gradually diminished we still find teachers dissatisfied and asking for a still further reduction.

The following table shows the process of reduction of the curriculum :—

Formerly.	At present.	
Middle School examination.	Lower Secondary examination.	Educational Rules.
(i) All the subjects were treated as compulsory.	Some subjects are treated as compulsory and others optional; Geography and Indian History being treated as compulsory and	Geography and Indian History treated as optional * and
(ii) Euclid being among them.	Euclid optional.	Euclid and Algebra omitted.
(iii) The course prescribed in Algebra or universal Arithmetic as it is called more extensive than at present.	The course prescribed in Algebra less extensive than formerly.	
(iv) Text books in both languages prescribed.	No text books	

At the conference of the Madras Teachers' Guild, 1898, it was decided that text books in the languages be prescribed and that candidates examined in them and that partial success be recognized.

4. Grants for the third form are calculated upon the result of the Lower Secondary examination. In article 33 of the revised *Grant-in-Aid Code* it is laid down that three optional subjects will be enough so far as the Lower Secondary forms go. So that the *Grant-in-Aid Code* will be satisfied if a pupil passes in (1) first language, (2) Arithmetic, (3) Geography, (4) Indian History, (5) Second language, the last three being treated as optional subjects.

For securing the Lower Secondary certificate the pupil must pass in another optional subject, inasmuch as Geography and Indian History are treated as compulsory subjects. No grants are given for partial success. Since the removal of Euclid from the curriculum, either Elementary Science or the History of England has to be brought up by male pupils.

5. Thus it will be seen that there was a time when boys studied six subjects,† but now the masters, not satisfied with the cutting away of text books, and subsequently of Euclid and Algebra, are trying to approach the Commissioner for the Government Examinations saying "if your honour will be pleased to revise the Lower Secondary Curriculum in the light of the revised *Grant-in-Aid Code* it will really be a great boon conferred upon thousands of young boys whose brains are hitherto overburdened with the study of various subjects."

A reference to Appendix A will show that under the scheme of the Middle School Examination, Mathematics—that is to say Euclid Book, I, with Deductions and Algebra to the end of Fractions—was practically (that is, to all pupils except to those of recognized Art, Industrial or Commercial schools) compulsory.

So for 20 years, till 1899, Geometry was taught in all ordinary schools. The teaching may not have been perfect but the subject was taught better than many other subjects.

6. At the time of the introduction of the Middle School Examination Scheme in 1879 it was arranged with a view to the subject being studied with greater care and thoroughness that four, instead of three, years should be devoted to the study of Euclid. Under the Lower Secondary Examination Scheme the subject was taught generally in the Second Form; in some schools even in the First Form. As the result of the recommendation of the Educational Conference of 1899 Geometry was removed from the Curriculum. Notwithstanding this it was continued to be taught until the Notification of the Director of Public Instruction in March 1902.

7. Previous to the December 1899 Conference there was dissatisfaction amongst teachers with the state of Lower Secondary education, and though, as the invited opinions suggested, the faults we have mentioned at the opening of this paper might legitimately have been held important reasons to account for the unsatisfactory state of things, the educationists in Conference assembled, chose to attribute it all to the *inoffensive* subject of Geometry and decided to remove it from the curriculum of studies. It cannot be said that all or even a majority of those actually engaged in the teaching of the subject were consulted at the time.

Curiously enough Geometry was only an *optional* subject so that there was no necessity to remove it. Probably the fact of the matter was that the educationists who advised the Director were guided by the general statements of their assistants that Euclid was a difficult subject to

* These were treated as one subject under the Middle School Examination scheme and are now counted as two subjects.

† Five, if Euclid and Algebra be taken together; it was even thought necessary to make a rule that "no male candidate may at any one examination appear in more than seven branches." Now a difficulty is felt about teaching three.

learn for boys of tender age. A more real way of relieving the burden of the boys would have been to make History and Geography, which were and are compulsory subjects, optional. The further history of the matter is instructive. The Government notification approving the removal of the subject appeared only in November of the following year (1900). All this time the managers who had voted for the removal of Euclid allowed it to be taught in their respective schools. Only Local Fund and Taluk Board schools under the direct supervision of Inspectors removed the subject in accordance with the views expressed by the Conference; and even after the Government notification was issued, schools other than these continued to teach the subject.*

The reason assigned by the managers for so doing was that so long as Euclid was a subject under the Lower Secondary curriculum they had to retain it as they were not able to find another suitable subject in its stead †, and several of them went so far as to request the Director to restore Euclid and Algebra to their old place in the curriculum of the Lower Secondary Examination. The Director acceded to their request "pending the revision of the Lower Secondary Examination Notification," by a notice, dated 28th February 1901. A year later this was abrogated by the following notification:—"Managers of Schools are informed that Geometry and Algebra should not be taught in Forms below the Fourth though they continue to be subjects for the Lower Secondary Examination." During the interval of a year the subject was taught, as the notice itself implies, so that in spite of the various vicissitudes in the history of the subject, Geometry has been taught without intermission in the majority of schools. The fact is clear proof that of the optional subjects for the Lower Secondary Examination Geometry is the most suitable

8. Now the curriculum of studies has to be considered with reference to various classes of institutions.

(1) Schools which are placed under the permanent system of grants and those that receive salary grants. These are periodically inspected by the Government Inspectors but have more or less freedom in following the curriculum prescribed by the Educational Department. So also the Middle classes attached to High Schools;

(2) Municipal and Board Schools which are under the direct supervision of Government Inspectors;

(3) Those (by far the largest number) placed under the *Grant-in-aid* system under which passes in the Lower Secondary Examination are made the test for earning grants.

The last two classes of schools must obviously feel the difficulty when a subject like Euclid which they have been teaching for a long time is prohibited.

9. If Euclid is to be removed, the following are the possible optional subjects: (1) the History of Great Britain and Ireland, (2) Elementary Science. To choose the former alternative would be to encourage more memory work. Usually, History is learnt by boys in the Lower Secondary classes from catch-penny "Analyses" and "Keys" mechanically learnt by rote. It is more than doubtful whether boys have sufficient knowledge of English to learn History from a standard book. Science friends in their enthusiasm press forward the claims of Elementary Science. Whatever may be said in the abstract in favour of the subject, there are many practical difficulties in teaching the subject in our Lower Secondary classes. As a matter of fact Science teaching even in the High School classes has been anything but satisfactory, and as the report of the Universities Commission says "this portion of the work of the Matriculation classes has proved most unsatisfactory—so unsatisfactory that the University of Madras has recently decided to alter its rule by combining the subject of Science with those of History and Geography under one head. The reason which lies behind all this is the impossibility of securing that the teaching of Science in schools, the majority of which are not equipped for this purpose shall be adequate as an introduction to the study of the subject in an University course." The objection applies with greater force to the teaching of Science in Lower Secondary classes which are not taught by Science Graduates and as the Górávári Teachers' Conference says, "the subject pre-supposes a command of English quite beyond the attainments of pupils of Lower Secondary standard. A reference to the list of failures in those subjects (History of Great Britain and Ireland and Elementary Science) last year (1900) clearly proves that they are rather hard nuts to crack as they involve a great strain on the brains of the pupils."

Nor can any other subject fitly take the place of Euclid whether the question is considered either from the point of view of the High School or the Lower Secondary classes.

10. As to the teaching of Euclid we think the allegation is untenable that boys in the Lower Secondary classes cannot understand it, and the assertion that the propositions are learnt by heart, and other similar allegations point only to the need as the University Commission Report says, for a more rational system of teaching.‡

11. Thus, while as we have seen, History encourages *cram*, and Elementary Science is impracticable, Geometry can be taught fairly well. It is astonishing that considering the fact that it affords a mental discipline to the boys, the like of which the study of neither the History nor the

* In Madras Town, for instance, Geometry was taught in the Middle School classes of the Christian College, the Church of Scotland Mission College, Wesleyan Mission College, Govinda Naicker's Middle School and the Hindu High School, Triplicane. In the Mufassal also with the exception of St. Joseph's Institution, Trichinopoly, the same was the case.

† So too a complaint was once made against the removal of Euclid from the curriculum in the columns of the *Madras Mail* by "School Master in a fix." Boys appearing for the Lower Secondary Examination may also take up any one of the subjects of the Elementary Technical Examination, but this course is impracticable as the examination in that subject takes place at a later time.

‡ The report makes the remark with reference to the F.A. Examination; but it is equally applicable to the Lower Secondary curriculum.

Elementary Science that can be taught in the Lower Secondary classes can possibly afford, the teachers should have seen fit to recommend its removal. From the time of Plato who wrote on the door of his house, 'Whoso knows not Geometry let him not enter here,' all thinking men have advocated the study of Geometry as an instrument of intellectual education.

"It is something for men to learn what proof is, and what it is not: and I do not know where this lesson can be better learnt than in the schools of a Science which has never had to take one footstep backwards, which has never asserted without proof, nor retracted a proved assertion; a Science which, while ever advancing with human civilization, is as unchangeable in its principles as human reason.

"It is not therefore with the desire of making Mathematicians of them, but to make them learn to reason, that we advocate the teaching of Geometry to boys." If Geometry is to remain in the curriculum the question that next arises is in what Form is it to be taught—whether on the basis of Euclid or not. We advocate the former course. Nothing definite has been arrived at as the result of the agitation in England to find a suitable Geometrical text-book or Syllabus instead of Euclid."

Speaking on this subject, Dr. Whewell said:—

"When a demonstrative Science has once been thrown into a rigorous logical form, it possesses a permanence and solidity which eminently fit it for being an element of intellectual education. Euclid's Elements are, to this day, at the same time the best instrument of mental discipline, which we possess. Almost all the alterations which have been made in that work, in more recent times, under the pretence of rendering it more easy, or more compendious, have tended to diminish its usefulness in our system of education. And a person writing an elementary book of Mathematics cannot aim at any higher success, than that his work should keep its ground and discharge its office as long and as well as Euclid's Elements of Geometry have done. Yet perhaps it may sometimes appear, both to teachers and students, that it is a waste of time and a perverseness of judgment to adhere to the ancient kind of Mathematics (Arithmetic and Geometry) when we have, in the Modern Analysis, an instrument, of greater power and range for the solution of problems; giving us the old results by more compendious methods; an instrument, too, in itself admirable for its beauty and generality. But to this we reply, that we require our *Permanent Mathematical Studies*, not as an instrument, but as an exercise of the intellectual power: that it is not for their results but for the intellectual habits which they generate, that such studies are pursued. To this we may add, as we have always stated, that, in most minds, the significance of Analytical Methods is never fully understood except when a foundation has been laid in Geometrical studies. There is no more a waste of time in studying Geometry before we proceed to solve questions by the Differential Calculus, than there is a waste of time in making ourselves acquainted with the grammar of a language before we try to read its Philosophical or Poetical Literature."

Professor DeMorgan said "There never has been, and till we see it we never shall believe there can be, a system of Geometry worthy of the name, which has any material departures (we do not speak of corrections, or extensions, or developments) from the plan laid down by Euclid."

12. And the best proof after all is that, in spite of the agitation in England, the agitators are practically where they started.* We have no objection, as Professor DeMorgan says to corrections, extensions or developments on Euclid's plan; such are those proposed in *School World*, October 1902, e.g., omitting I-7, proving I-8 by the direct method, etc., etc., in Book I. Such changes are to be found in almost every modern text-book and are such as every intelligent teacher makes while teaching the subject. The proposal however has been made to make Geometrical Drawing take the place of Euclid. But besides the fact that by so doing we lose the all-important mental discipline afforded by reasoned Geometry, the difficulty remains of precisely fixing the scope and extent of the subject for purposes of study in the Lower Secondary classes. As we started by pointing out if Tamil and Telugu are made the *media* of instruction in a non-language subject like Euclid, the initial difficulty of mastering a foreign language is removed, and boys can readily understand the subject and derive from it to the fullest extent the mental discipline it is capable of imparting.

* See *School World*, October 1902.

APPENDIX A.

NOTE I.

Under the Middle School Examination Scheme brought into force on the 17th October 1879, Mr. Grigg, the then Director of Public Instruction, gave prominence to the Geometry teaching in the lower classes as will be seen from the following:—

For that examination the compulsory branches were 5.

- BRANCH I First Language (English),
II Geography and Indian History,
III Arithmetic,

and for the remaining two compulsory branches candidates were permitted to have the option of taking up any one of the following groups a, b, c, d, e:—

- (a) Branch VI Mathematics
and
Branch IV Second Language.

[This group is as a general rule open only to pupils of ordinary schools or classes.]

- (b) Branch VI Mathematics
and
Branch VII Introductory Science, etc.
(c) Branch VI Mathematics
and
Branch XXVII Mensuration,
and either
Branch XI Drawing,
or
Branch XII Modelling.

- (d) A group of subjects open only to pupils of recognized Art or Industrial Schools or classes.
(e) A group of subjects open only to pupils of recognized Art or Industrial Schools or classes.

Branch VI is Mathematics, Euclid Book I with deductions: and Algebra to the end of Fractions.

The following figures give the number of failures in the F.A. and the Matriculation examinations for the five years 1897—1901. Mathematics, it will be seen, accounts for many failures. This is due, as Justice Gurudas Banerjee observes, to the inefficiency of Mathematical teaching in the lower classes.

NOTE II.

	1897.		1898.		1899.		1900.		1901.	
	F.A.	Matric.	F.A.	Matric.	F.A.	Matric.	F.A.	Matric.	F.A.	Matric.
English	734	3,315	744	3,199	834	2,626	828	3,892	609	2,922
Second Language	351	898	429	1,073	405	1,034	371	1,328	336	1,352
Mathematics	843	2,217	734	1,873	992	2,553	847	3,197	984	3,672
Science	665	1,578	636	1,69	1,038	3,957	495	4,163	643	3,430
History	647	1,678	591	1,147	679	2,165	571	3,227	474	1,860

In favour of re-introduction (43).

1. Bobbili Samasthanam High School.
2. Ellore C. M. S. High School.
3. Narasapur Taylor's High School.
4. Bezvada C. M. S. High School.
5. Guntur Sanskrit High School.
6. Masulipatam Noble College.*
7. Nuzvid Sri Rajah's High School.*
8. Nandiyal S. D. G. High School.*
9. Nellore F. C. M. High School.
10. Madras Bishop Corrie's Grammar School.
11. " Church of Scotland Mission College.
12. " Doveton Protestant College.
13. " Pachaiyappa's College.
14. " St. Mary's College.
15. Vepery S. P. G. High School.
16. Mailapur San Thomé Seminary.
17. Royapettah Harris High School.
18. Muthialpet High School.
19. Triplicane W. M. High School.
20. Chingleput Native High School.
21. Conjeeveram Pachaiyappa's High School.
22. Tiruvallur W. M. High School.
23. Gooty London Mission High School.
24. Madanapalle High School.
25. Tirupati H. L. G. M. High School.
26. " Sri Mahant's Hindu High School.
27. Vellore Arcot Mission College.
28. " Sri Mahant's High School.
29. Erode London Mission High School.
30. Salem London Mission High School.
31. Kumbakonam Town High School*.
32. Mannargudi National High School.
33. Negapatam Wesleyan Mission High School.
34. Shiyali Lutheran Mission Central School.
35. Trichinopoly S. P. G. High School.
36. Pasumalai A. B. M. High School.
37. Ramnad S. P. G. High School.
38. Megnanapuram C. M. S. High School.

(Madras town.)

* Would retain Euclid's Elements owing to the difficulties of selecting a suitable subject for the Lower Secondary Examination.

39. Pattamadai High School.
40. Palamecottah C. M. S. High School.
41. Alattur High School.
42. R. S. Lepper, Esq., M.A., F.M.U.
43. M.R.Ry. S. Radhakrishna Aiyar Avergal, B.A., F.M.U.

Against re-introduction (18).

1. Vizagapatam Mrs. A. V. Narasinga Rau College.
2. " London Mission High School.
3. Cocanada Pittapur Rajah's College.
4. Guntur A. E. L. M. College.
5. Madras Black Town High School.
6. " Hindu Theological High School. } (Madras Town.)
7. Triplicane Hindu High School.
8. Chittoor Board High School.
9. Punganur American Mission High School.
10. Erode Mahajana High School.
11. Mannargudi Wesleyan Mission High School.
12. Tiruvalur Board High School.
13. Shiyali Hindu High School.
14. Trichinopoly National High School.
15. Madura American Mission High School.
16. " Setupati Town High School.
17. Srivilliputtur C. M. S. High School.
18. Mangalore B. G. M. High School.

Neutral (2).

1. Triplicane Madrasa-i-Azam.*
2. Conjeeveram F. C. M. High School.

* The Headmaster being a Government servant could not express an opinion.

Order—No. 16, Educational, dated 10th January 1907.

Recorded with the remark that the memorialist should address the University on the matters referred to in his memorial.

(True Extract.)

H. D. TAYLOR,
Ag. Secretary to Government.

To the Memorialist.
Editors' Table.

EDUCATIONAL DEPARTMENT.

NOTES CONNECTED WITH G.O., No. 16, EDUCATIONAL, DATED
10TH JANUARY 1907.

[SUBJECT.—*The University Regulations.*]

From M.R.Ry. Rajagopalachari, dated 30th December 1906.

A draft order on the lines of the Honourable Member's orders on page 2 of notes with G.O., No. 13, Educational, dated 10th January 1907, is submitted below for approval.

P.R.—7-1-07.

K. RANGASWAMI AIYANGAR—7-1-07.

C. G. MACKAY—9-1-07.

[G.O., No. 16, Educational, dated 10th January 1907.]

CURRENT FILE.

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From	Number.	Date.	Pages.
[8] Mr. H. P. Raygozels Charms	..	30. 12. 06	1-8 + enclosure

PAPERS PUT UP WITH CURRENT No.

Papers of the department to which the current belongs.

Number.	Date.	Original (=O) or spare copy (=S. C.).	Remarks. (In this column such of the papers as have been removed for copying, printing, etc., should be marked with a cross.)	Initials of Referencer with date in token of return to Reference department.

Papers of other departments.

Department.	Number.	Date.	Original (=O.) or spare copy (=S. C.).	Despatcher to note the return of the papers to the departments concerned.

Sir,

I beg to bring to your kind notice the fact that it was resolved at a meeting of the Council of Native Education to invite the opinions of the Head Masters of High Schools and other gentlemen interested in education with reference to the recommendation of the Senate of the Madras University that Geometry "Practical and Theoretical" be substituted for Euclid.

I enclose for your kind acceptance a pamphlet "On Geometry Teaching in this Presidency". It may be noticed that

(1) No substitute for Euclid has been found in England after 30 years' agitation.

(2) Some of the books that have recently been published with the object of providing such a substitute however suitable they may be for Art and Technical Schools are unsuitable for ordinary schools.

(3) For the Oxford, Cambridge, Dublin, Aberdeen and even for the London University examinations, Euclid continues to be the basis of instruction in Elementary Geometry.

(4) Even for the preliminary examination conducted by the Madras Civil Engineering College recently, Euclid was the examination Text Book.

(5) Euclid was an extremely popular subject with Lower Secondary Candidates as an optional subject before the prohibition of its teaching in 1902.

(6) The Syllabus issued by the Bombay University under the new University Act contains nothing which any decent Text Book of Euclid does not contain; on the contrary it contains much less.

(7) Practical Geometry will no doubt train the hand and the eye but it is much more suitable for the Lower Secondary classes.

(8) The numerous failures in the Matriculation examination in Science for many years and in History and Geography during recent years are largely due to want of definiteness in the scope and extent of the curriculum in those subjects. The proposed change in Geometry teaching will introduce a similar indefiniteness and may be responsible for further failures.

As it is intended to submit a memorial to Government on the subject I shall be obliged by your favouring me *early* with an indication of your views, on the enclosed post card, to enable me to place the same before the Council of Native Education.

Yours truly,
S. RAJAGOPALA CHARI.

10
Enclosure II

MADRAS,
26th November 1906.

Sir,

I beg to send for your kind acceptance a reprint of my letter* dated 12th June 1906. *re* "Matriculation Geometry" and also a copy of the replies I have received from the Head-Masters and other gentlemen, to whom my thanks are due for their kindness in sending replies. I have further to add in this connection that Euclid should be the basis of instruction in Theoretical Geometry.

(1) It is evident from the replies above referred to that whatever be the conditions, in Germany and in France which must have rendered necessary some substitute for Euclid this country is not prepared for such a change at present.

(2) Nobody desires Euclid to be taught with all its faults. Improved methods of teaching may be adopted even in Euclid. Euclid is not studied merely for the one hundred propositions of the first three books. Numerous intelligent exercises are and should be framed on their basis. The present day publications Tom's Geometry, Bill's Geometry, and Fox's Geometry have yet to establish a name.

(3) The antipathy to Euclid would disappear if the teaching of the subject is entrusted to competent masters.

(4) It is a subject in which any attempt at cramming may easily be detected.

(5) It is the only subject which will develop the reasoning faculties of children.

(6) There is no objection to Practical Geometry, but each is good in its own way. Practical Geometry and Theoretical Geometry should not be combined. Practical Geometry should be learnt by pupils in Technical schools and Theoretical Geometry by pupils preparing for an University course. If it is thought necessary Practical Geometry may be made optional with Theoretical Geometry.

(7) Curiously enough Euclid continues to be the basis of Instruction for boys in European schools. The Educational department apparently does not view the Senate's revolutionary changes with great favour.

(8) The effective teaching of Practical Geometry is impossible with our large classes.

(9) Our teachers themselves are many of them not familiar with the subject. It is essential that the foundations of the subject ought to be laid by competent hands.

I request the favour of your opinion at an *early* date before addressing Government on this subject.

Yours truly,

S. RAJAGOPALACHARI,
Joint Secretary to
The Council of Native Education.

11
Enclosure III

18
Replies from the Head-masters of High Schools and other educationists to the circular letter of the Council of Native Education regarding the Teaching of Geometry in High Schools.

AGAINST THE SENATE'S PROPOSAL.

1. I am decidedly in favour of the retention of Euclid, as the University Examiners, I am informed by the Registrar, accept all valid proofs in the alternative. Practical Geometry need not and should not be taught in an arts course as for the Matriculation Examination. It should be taught and is taught in my School and many other Schools, only in the Lower Secondary Classes.

Municipal High School, Chicacole,
17th July, 1906

G. MUKUNDA ROW,
Head-Master.

2. I must heartily endorse every one of your convincing arguments against the Senate's Proposal for the substitution of Theoretical and Practical Geometry, in the place of Euclidian Geometry now in use. The 8th para of your circular letter is especially irrefutable and must make every Head Master pause before he adopts the very suicidal step of raising his voice in support of the Senate's Proposal. Let there be beneficial changes in subjects in which there is a crying demand for them. There has been no complaint worth the name as regards the curriculum or the questions of the Matriculation Mathematics. English and general knowledge are badly in need of changes, especially the latter. The Senate had better leave mathematics alone and effect all possible improvements in English and general knowledge. Even if the Mathematical changes newly introduced into the School curricula of England could be called improvements, we might say there is yet time enough for such changes here. Let the times demand the changes. Then the changes would be welcome.

Maharaja's High School, Bobbili,
8th September, 1906.

V. RAMALINGASWAMI, B.A.,
Head-Master.

3. In reply to your circular letters I am of opinion that the first three Books of Euclid's Elements should be continued for the Matriculation Examination, and that all practical work in Geometry, which is contemplated in the Senate's Resolution and which is absolutely necessary, should be confined to the three Books of Euclid.
Board High School, Amalapuram. T. V. SRINIVASA AIYAR,
21st July, 1906. Head-Master.

4. As no suitable substitute for Euclid has yet been found and as the subject Geometry 'Practical and theoretical' may lead to disastrous failures in the examination for want of definiteness in its scope, I am in favour of retaining Euclid in the Matriculation curriculum. Practical Geometry, as it trains the hand and the eye, may, with advantage, be introduced in the third and the fourth Forms.
Taylor's High School, Narsapur. I. GANAPATI RAU,
14th August, 1906. 1st Asst. for Head-Master.

5. Practical Geometry may be taught with advantage to the Lower Secondary Forms.
Euclid should be retained in the curriculum for the Matriculation Examination.

A. E. L. Mission High School, Peddapur. M. S. RAMA RAO,
15th July, 1906. Head-Master.

5. With reference to your card of 5th inst I wish to say that I have not been in receipt of the circular letter referred to therein. If the matter about which my opinion has been required be about the necessity of teaching Geometry to the Lower Secondary Form, I should say that it is both desirable and expedient to teach Geometry and Algebra in the Third Form.

A. E. L. M. High School, Peddapur. M. S. RAMA RAO,
15th September, 1906. Head-Master.

6. Euclid's Elements of Geometry has answered all the purposes of education in Geometry all these years, and I see no reason why it should be given up now, and the subject left in an indefinite way. In the Edinburgh University Euclid is still the basis of Geometrical instruction.

C. M. S. High School, Bezwada, D. ANANTAN,
18th July 1906. Head Master.

6. I am *against* any change in the method of Geometrical teaching. The present suggestion is vague; and Euclid's Geometry is still used in English and Scotch Universities.

C. M. S. High School, Bezwada. D. ANANTAN,
7th September, 1906. Head-Master.

7. I consider that Euclid should be retained for the Matriculation Examination, because there is no book better adapted for mental training.

Noble College, Musalipatam. WILLIAM PENN,
7th September, 1906. Principal.

8. In my humble opinion the introduction of Practical Geometry into the Matriculation curriculum does not better the condition of the pupils. Practical Geometry, while giving a good training to the eye and the hand does very little by way of developing the intellect and the reasoning faculty of the student. The High Schools as they are manned now, have not many teachers who can do justice to the new subject if entrusted to them. As you say, under the proposed new curriculum the examination in Geometry too will become vague and indefinite which is not a thing to be desired. Practical Geometry may however, be introduced in the Lower Secondary Classes with some advantage to supplement the drawing work.

R. Ch. High School, Pittapuram. Head-Master.
17th July, 1906.

9. I am for retaining Euclid in the Matriculation Curriculum. If Geometry Practical and Theoretical were to be substituted for Euclid, there is no doubt that it will be indefinite in its scope and thereby bring about further failures in Mathematics.

R. V. M. High School, W. RAMACHANDRA IYER,
Venkatagiri Town. Head-Master.
10th August, 1906.

10. I have the honour to state that I am far from thinking that the replacement of Euclid by Geometry will serve any useful purpose and that it will be advisable to retain Euclid while enforcing greater attention to the practical side of it, viz. drawing Geometrical figures.
Board High School, Bapatla. Head Master,

11. I agree with you in thinking that Practical Geometry will do for the Lower Secondary Class but Euclid's Elements are the best for the Upper Secondary Department.

A. B. M. High School, Nellore,
14th August, 1906.

KOLANDAVELU,
Head Master.

12. I am not in favour of the recommendation of the Senate of the Madras University to substitute Practical and Theoretical Geometry for Euclid.

Town High School, Guntur.
2nd August, 1906.

T. T. KRISHNA AIYAR,
Head Master.

13. I am in entire accord with the views of the Council as regards the difficulty of substituting Practical and Theoretical Geometry for Euclid and the desirability of retaining the latter as a subject of instruction for the Matriculation class. The vagueness and indefiniteness of the subject, not to speak of the inferiority of its educational value, will prove a great stumbling block to both masters and pupils and I am strongly opposed to the introduction into the curriculum of studies of anything that will place us at the mercy of chance.

Hindu High School, Masulipatam,
21st July 1906.

S. MUTHU AIYAR,
Head Master.

14. Kindly allow me to inform you that I am not in favour of the change proposed by the Senate. The substitution of Euclid by Modern Geometry, Practical and Theoretical, will bring chaos where there has been order.

Municipal High School, Kurnool,
15th July 1906.

K. R. RAGHUNATHA CHARI,
Head Master.

15. Those who are teaching Geometry in this School are I believe in favour of retaining Euclid and I agree with them that what has been the foundation of Geometrical teaching for so many generations is not lightly to be put aside for some new method.

S. P. G. High School, Vepery,
8th August 1906.

R. U. POTTS,
Head Master.

16. I believe that Euclid, as an intellectual developer, has no rival; and that it never can be ousted from the school curriculum without causing irreparable loss.

St. Patrick High School, Adyar,
15th July 1906.

J. P. PRICE,
Head Master.

17. 'Euclid' is intended to be taught in the School for General Education mainly for the mental discipline it affords, for a habit of accurate and consecutive deductive reasoning. Any methods of teaching of the subject not calculated to train the children to this habit of thought would be unsatisfactory and there need be only a reform in the lines of Harpur's Euclid, not a revolution. If Euclid is to be replaced by any other book, there has not been a book treating of the subject, which though very much suited for Art and Technical Schools, is so far suitable for schools for general Education.

As for 'Practical Geometry' it is to be introduced in the ordinary school mainly to train the hand and eye and to give a habit of neatness and mechanical dexterity. The department lays so much stress on the training of the hand and eye only in the lower classes of the school and this subject may, with profit be introduced in the Lower Secondary Department. To consider the practicability of the teaching of this subject the classes need be small so as to enable the teacher to supervise the working with rulers, set square, protractors and compasses and the teacher shall be an efficient hand, himself an expert in producing good specimens. Theoretical Geometry may be taught in the High School and an examining body might retain Euclid to secure a definiteness of the subject, until a more suitable text book is available.

Hindu High School, Madurantakam,
14th July 1906.

M. DESIKACHARI,
Head Master.

18. I am not for Geometry Practical and Theoretical but for Euclid as it is taught now in our High Schools.

W. M. High School, Thiruvellore,
8th July 1906.

P. SUBRAMANIA IYER,
Head Master.

19. I am of opinion that both Practical and Theoretical Geometry have to be taught, the former, if practicable, in the Lower Secondary

Classes on account of the excellent training it affords to the hand and the eye of the student and the latter on account of the valuable mental discipline it affords to the student, too valuable to be lost. Instruction in Theoretical Geometry must be on the lines of Euclid, as any other mode of teaching it is sure to result in want of uniformity, vagueness and confusion.

Municipal, High School, Bellary,
6th July 1906.

A. BHEEMACHAR,
Head Master,

20. In reply to your kind note of the 12th instant I have pleasure in saying that considering all the grounds urged for and against, in my humble opinion, it is preferable to retain Euclid as it is.

M. H. S. Anantapur,
22nd July 1906.

A. S. ARUNACHALA IYER,
Head Master.

21. I have the honor to state that in the absence of Geometry as a subject in the Lower Secondary classes it would be desirable to have the Elements of Practical Geometry in the Fourth Form. But should the curriculum be changed in the L. S. department by the introduction of the subject the High School course need not be crowded with the same.

London Mission. School, Gooty,
2nd August, 1906.

S. VENKATACHARLU,
Head-Master.

22. I have the honor to state that Practical Geometry may be introduced with advantage provided suitable Text books are available and sufficient time, say two years at best, is given before the change is notified to be prescribed for the Matriculation Examination to enable both the pupils and the teachers to familiarise themselves with the new subject. Euclidian Geometry is not serving its purpose in the minds of the students.

High School, Mudanapalle,
19th July 1906.

Head Master,

23. I believe with you that Euclid is better suited to train the logical powers of pupils than Practical Geometry, which may, how-

ever, be profitably taught in Lower Secondary classes as a preliminary.

A. M. L. High School, Punganur,
3rd August 1906.

A. PONNAYYA,
Head-Master.

24. I am at one with you in what you have pointed out in your letter of the 12th inst., about the probable consequences of the substitution of Geometry, "Practical and Theoretical" for Euclid.

H. E. L. M. High School, Tirupati,
2nd Augt., 1906.

S. STEPHEN,
Head-Master.

25. We are for Euclid rather than the proposed recommendation of the Senate of Madras University.

We also may add that two-thirds of the marks for Euclid should be allotted to the *Text of Euclid* and the remainder for deductions. It is simply shocking to read the number of failures every year in the subject. Sorry for the delay in response to your circular.

St. Joseph's High School, Coonoor.
30th Aug., 1906.

L. FORDE,
Principal.

26. We have carefully perused the pamphlet on Geometry teaching in High Schools, and we are of opinion that the present system will do more good in respect of mental training and instruction than that under contemplation. It is highly desirable that Geometrical drawing should be carefully taught in the Lower Secondary forms so that the same students when they come up for the High School Forms will be perfect in both Theoretical and Practical Geometry. Should the Euclid's elements be replaced by other treatises on the subject, it would not only create chaos and vagueness in its teaching, but would also tend to enhance the percentage of failures in Matriculation Mathematics.

B. H. School, Dharapuram, K. R. RAMAKRISHNA AIYANGAR.
17th July, 1906.

27. As modern Geometry will be unsuitable for Madras Schools in view of its indefiniteness, I am for the retention of Euclid. Practical Geometry may be introduced in the Third Form.

Mahajana High School, Erode,
19th July, 1906.

T. S. SUBRAMANIAM,
Head-Master,

28. The introduction of Theoretical and Practical Geometry in the Matriculation Curriculum will undoubtedly cause more failures in the Matriculation Examination, and will be an additional burden upon the Matriculation Candidates. Euclid is a favourite subject with the Matriculation as well as Lower Secondary candidates. Any attempt to replace it will simply make the position of the unfortunate candidates miserable.

Diamond Jubilee High School, V. S. SITARAMA AIYAR,
Gopichettipalayam, 16th July 1906. Head-Master.

29. Please accept our sincere thanks for your kind circular. This Institute is for teaching Practical Geometry in the Lower Secondary Forms, and Euclid in the High School classes.

Municipal High School, Karur, K. KRISHNASWAMI,
16th July 1906. Head Master.

30. I am one with you in thinking that Euclid's Geometry should be taught in the High School classes and that its place in the Matriculation curriculum should not be taken by Practical Geometry.

L. M. High School, Salem, M. SUNDARUM, B.A.,
8th Aug., 1906. Head-Master.

31. I heartily thank you for your kind communications. I request to be excused for not having replied to you earlier. I agree with you in the main though differing in a few details. As a Local Board servant I am not allowed to pass any remarks on Departmental orders.

B. H. School, Namakal, C. R. SRINIVASA RAGAVA CHARI,
2nd Aug., 1906. Head-Master.

32. Thank you for your Circular letter and the pamphlet. My opinion briefly is this. The subject must be geometry Theoretical alone a definite Syllabus being prescribed on the basis of Euclid. Books I-IV. The Lower Sec. Forms may have some grounding in the elementary principles of Practical Geometry. Any how geometry Practical and Theoretical is very vague.

High School Mayaveram, S. NARAYANASAMI,
11th Aug., 1906. Head-Master.

33. I am of opinion that Geometry should be taught without any material departures (I do not speak of corrections or extensions and developments) from the plan laid down by Euclid.

Pudukotah, S. RADHAKRISHNA AIYAR, B.A.
17th July 1906. Principal.

34. Euclid must remain the basis of Geometry teaching. A suitable substitute has yet to appear and may not appear. Practical Geometry in the IV Form and Euclidean Geometry in the V and VI Forms will serve all purposes. The proposed change as regards Matriculation Geometry will assuredly introduce indefiniteness as to the scope of study and will certainly be responsible for many failures in the Matriculation Examination. The Anti-Euclid Geometricians think Euclid's propositions cannot be taught analytically.

N. H. School, Mannargudi, N. S. VENKATARAMA AIYAR, M.A., L.T.,
15th July 1906. Head-Master.

35. I am *not* in favour of the Senate's proposal to introduce Geometry instead of Euclid in the Matriculation course.

Findlay College, Mannargudi, R. SMAILES,
3rd August 1906. Principal.

36. The excision of Euclid or Theoretical Geometry from the Matriculation curriculum will be a calamitous blunder. Practical Geometry is a technical subject and may stock the memory with useful formulas and rules which the pupil need not prove to himself by systematic reasoning. It can never be a substitute for Euclid which aims at giving that training to the mind which would be serviceable in the logical study of every other subject. I am sure that a number of the men in our country who have been esteemed for their cultured intelligence are greatly indebted to Euclid. A generation with minds not trained in the Euclidean method will be intellectually inferior to one which had that training. Gopala Row, Runganada Mudaliar, Mr. R. V. Srinivasa Aiyar, the late Dewan Bahadur Srinivasa Raghaviengar and a great many others have owed their intellectual power in no small degree to their study of Euclid. If they had studied only Practical Geometry, it would not have done them so much good.

N. H. S. Negapatam, S. KRISHNASAMI AIYAR,
21st July 1906. Head-Master

37. In reply to your circular I have the honour to inform you that we (the staff of my school) fully agree with you in the matter of Geometry teaching. Since no standard authority exists in Modern Geometry we consider the attempt to re-place Euclid as premature. Modern Geometry or Practical Geometry may be taught in the lower classes up to the IV Form. In teaching Euclid modern methods of proof may be used, but Euclid's order must be observed.

Lutheran Mission Central High School, Shiyali, G. SHIVA RAU,
3rd August 1906. Head-Master.

38. Euclid teaches a man whether a conclusion follows from the premises given. Its value as a mental discipline is incalculable. Practical Geometry, if it does not contain much of Euclid, is an inferior substitute; if it does, is a superfluous luxury.

St. Peter's College, Tanjore, MUTHUKUMARAN,
5th August 1906. Professor of Mathematics.

39. Adverting to the circular letter of the *Council of Native Education* reGeometry Teaching, dated the 12th July 1906, I have to state that I am not in favour of the changes proposed.

Central High School, Tiruvady, T. RAMA IYER,
9th September 1906. Head-Master.

40. In reply to your circular dated 12th July 1906, I beg to state that the present curriculum in Geometry be retained. If the recommendations of the Senate should however be approved by the Government, suitable text-books may be requested to be introduced, so as to avoid the want of definiteness in the scope and extent of the curriculum.

Board High School, Lalgudi, L. S. NATARAJA SARMA,
17th July 1906. Head-Master.

41. My view on your pamphlet on the "Geometry Teaching in this Presidency" is—that Euclid should be retained for Theoretical Geometry for reasons pointed out by you.

Practical Geometry of Euclid's problems and problematic riders are to be entrusted to the care of efficient "Drawing Masters." in the High School Classes.

National High School, Trichinopoly, G. SESHAIYANGAR,
3rd August 1906. Head-Master.

42. I find the opinion of my masters is that Geometry should be retained. I am not a Mathematician and cannot give an independent verdict on this subject.

S. P. G. High School, Trichinopoly, H. PAKENHAM WELSH,
19th July 1906. Manager.

43. I am for the re-introduction of Euclid's Elements which, I believe is the best means of securing the educational value of Geometry. As suggested in your pamphlet, the boys should undergo some training in Practical Geometry in the Lower forms in connection with Drawing, which will make them understand Euclid better. A little bit of Mensuration may be taught every now and then so as to give the subject a practical turn.

S. P. G. College, Trichinopoly, N. GANAPATI SUBBA AIYAR,
13th August 1906. Professor of Mathematics.

44. I had a discussion with my assistants who are experienced Mathematics Graduates, on the proposed change in Geometry Teaching. They are at one with me in thinking that, until a suitable substitute can be found, Euclid must continue to be the basis of instruction in Geometry, with a view to secure uniformity in teaching it and to avoid indefiniteness in the curriculum in that subject.

The Madura College, Madura, T. VENKOBACHARI,
2nd August 1906. Principal.

45. I am of opinion that the present system of having a text-book for Geometry such as Euclid is preferable.

Sourashtra High School, Madura, T. R. KRISHNAMACHARI,
9th August 1906. Head-Master.

46. If Euclid continues to be the basis of instruction in Elementary Geometry as you say, for the Oxford, Cambridge, Dublin,

Aberdeen and even for London University Examinations, I think it should be so for Madras also.

C. M. S. High School, Mengnanapuram, AMBROSE. V. THOMAS,
17th July 1906. Head-Master.

47. As has been clearly shown in your pamphlet, Practical Geometry is not practicable for instruction and examination purposes while its disciplinary value is much inferior to Euclid. I too am of opinion that the retention of Euclid in the Matriculation curriculum is desirable.

C. M. S. High School, Palamecottah,
10th August 1906.

MARTIN LUTHER,
Head-Master.

I fully concur in your view that Euclid should form part of Secondary Education. As you suggest, Practical Geometry may be advantageously taught in the Lower Secondary Department. The educative value of Euclid in developing the reasoning faculty cannot be too strongly dwelt upon.

Hindu High School, Srivilliputtur,
19th July 1906.

T. R. RANGASWAMI,
Head-Master.

49. Geometry should be taught in High School Classes mainly on the plan of Euclid.

But the students must be taught "Practical Geometry" elementary parts in the Lower Secondary Classes.

Hindu College, Tinnevely,
10th August 1906.

P. SITARAMA AIYER,
Professor of Mathematics.

50. To do away with a subject whose intellectual value has been tried and known for these so many years in favour of another which, even supposing for the sake of argument, can at best only equal, it is, in my humble opinion, not a wise policy. If, as alleged, boys are unable to grasp the subject, an improved method should be adopted in Schools and not the subject excised from the curriculum. Euclid can safely be continued as now, in the IVth Form.

St. Francis Xavier's High School,
19th July 1906.

G. SATYAGIRIRAJAN,
Head-Master.

51. I have gone through your pamphlet on "Geometry Teaching in this Presidency" and am strongly of opinion that Practical Geometry should be taught in the Lower Secondary classes by a competent qualified Drawing Master and that Theoretical Geometry should be taught in the High School Forms by a very efficient and successful Mathematics Master, taking keen interest in his work and the improvement of his boys in Geometry with the sympathy and enthusiasm of the late W. A. Porter of Kumbakonam in the seventies.

Rajah's High School, Ettayapuram, RAMAKRISHNA IYER,
9th September, 1906. Head-Master.

52. I have great pleasure to endorse your views and strongly protest against the introduction of Practical Geometry in the place of Euclid.

Native High School, Palghat,
23rd July 1906.

M. PARAMASWARAN,
Head-Master.

53. Your letter and the pamphlet on "Geometry Teaching in this Presidency." The latter was put in the hands of my first assistant who teaches Mathematics to the Matriculation Class. He and I are both decidedly of opinion that the substitution of Geometry "Practical and Theoretical" for Euclid cannot be expected to be attended with satisfactory results and that the retention of Euclid is from nearly all points of view highly desirable.

B. G. M. High School, Tellicherry,
24th July 1906.

78 K. RAMAN,
Head-Master.

54. From long observation and educational experience, I can say that Geometry ought to be taught in the High School Classes for the training it gives in accurate and consecutive thinking. This view has been supported by Lord Ampthill in His Excellency's convocation Address. Such training is given by Euclid, not by the recent publications intended as substitutes. A careful study of these publications enables me to say with De Morgen "There never has been, and till we see it we never shall believe there can be, a system of Geometry worthy of the name, which has any material departures (we do not speak of corrections or extensions or developments) from the plan laid down by Euclid." No doubt, some of Euclid's proofs can be simplified

and some are inaccurate. Students ought to be, and in good schools are, trained to point out these and suggest better proofs.

In the High School course, there are more subjects than one that train the pupils in inductive reasoning, but we have only Mathematics for this discipline in deductive reasoning. Eliminate this discipline, and the best Geometrical constructions will only swell the bulk of the stuff now crammed into the pupils' little heads.

Board High School, Coondapoor,
26th July 1906.

B. RAGHUNATHA RAU,
Head-Master.

55. Euclid's Elements must be retained as the Text-book for teaching Geometry in the IVth, Vth, VIth Forms in preference to any other Geometry. The course in practical geometry must be continued in the IVth and Vth Forms.

Setupati High School Madura,
14th September 1906.

C. NARAYANASWAMI IYER,
Head-Master.

56.* I am in full sympathy with the benevolent efforts of the Council of Native Education, though on the particular question set forward I desire to reserve my opinion,

S. P. G. High School Nandyal.

5th August 1906.

C. R. SAMUEL,
Head-Master.

57. Geometry may be taught in early years. Mrs. Court right sets children to draw circles with the free hand which they acquire gradually. Herbert Spencer says Children have a fancy for figures. Nature Exhibits neat figures in every object. It is only the method that has to be changed. If drawing is systematically taught in the manner now arranged and if modern methods are adopted in teaching Geometry I should have no objection to Euclid being taught in early years,

Mylapur,
14th July 1906.

T. R. RAMANATHA AIYAR, B.A., L.T.

58. I should welcome the re-introduction of Geometry in the III Form, provided a fair proportion of the course in History and Geography is cut off from the Lower Secondary Curriculum.

High School, Kumbakonam, V. R. VENKATESWARA AIYAR, M.A. L.T.,
27th October, 1906.
Head-Master.

* Neutral.

IN FAVOUR OF THE SENATE'S PROPOSAL.

1. On the whole I am for the proposed change. But I am afraid we shall have to employ specially trained men for the work of teaching Geometry intelligently and practically. Geometrical Drawing should be introduced.

A Book like that of Professor Hanumanta Raw's excellent Geometry must be made a parallel course of study to the Theoretical one.

W. M. High School, Triplicane,
2nd August 1906.

T. V. SWAMINATHA AIYAR,
Head-Master.

2. In reply to your post card of the 30th July 1906, I beg to state that I am in favour of the Senate's proposal.

Govt. Madrasa-i-Azam,
2nd August 1906.

D. A. HOBDAI,
Principal.

3. As regards your letter dated the 5th instant I beg to inform you that I am in favour of the Senate's proposals as regards Geometry Teaching as I think it will infuse new life into Geometry as it will be taught practically.

U. F. C. M. High School, Chingleput,
6th September 1906.

DANIEL G. MOSES,
Head-Master.

4. As my views are also against this proposal, I kept quiet; but since you press me to give an answer, I am sorry I have to say 'Nay' to the proposal.

Pach. High School Conjeevaram,
7th September 1906.

N. PARAMASWARA AIYAR,
Head-Master.

5. I am in favour of the new syllabus.
Staines High School Coonoor,
12th August 1906.

S. POTHAN,
Head-Master.

6. I am satisfied with the changes in the curriculum introduced by the Senate, and do not advocate the re-introduction of the teaching of Euclid.

Salem College,
2nd August 1906.

SPENCER A. SHUTIE,
Principal.

7. Please allow me to inform you that I am not at all in favour of Geometry Teaching.

C. M. S. High Srivilliputtur,
3rd August 1906.

A. PERIANAYAKAM,
Head-Master.

8. In reply to your circular and post card I think that Euclid as formerly presented and taught tends to cram. I would gladly have any change if only to break the long reign that memorising has had. I would recommend some **modern** presentation of Euclidean Geometry one of the numerous excellent books published by Macmillan.

Palamcottah,
12th August 1906.

E. WINCKLER,
Principal.

9. With reference to your pamphlet about Geometry teaching, which you were kind enough to send me I beg to state that, considering the fact that, at present only very few of the students of the matriculation class take up an University course, it would be better to teach Geometry both practical and theoretical whether based on the system of Euclid or not.

Raja's High School Kolongod (Palghat) S. RAMACHANDRAN,
17th July 1906. Head-Master.

10. Many thanks for your papers about Euclid. They have not been forwarded to me from Mangalore, but I expect to find them on my return there.

I am afraid I am badly in need of conversion, for I regard Euclid as an excellent lesson in logic but the worst text-book of Geometry for beginners that could be devised.

Ootacamund,
30th April 1906.

H. MALIM,
Principal.

10. I am of opinion that 75 per cent. of our students derive no benefit from the study of Euclid. I think it the worst possible text book for a beginner though it might usefully be given to students who have passed the B. A. (or perhaps the F. A.) examination. I certainly think that a change should be made.

Govt. College, Mangalore,
24th July 1906.

H. MALIM,
Principal.

Geometry Teaching in this Presidency.

In considering whether Euclid should be "excised" from the curriculum for the Matriculation Examination, modern Elementary Geometry being substituted for it or whether Euclid should be retained the following considerations should be kept in mind.

(1) The past history of the subject as studied in our schools.

(2) The practicability of introducing Elementary Geometry (a) viewed in the light of the experience gathered from the introduction of the reform in England (b) from the point of view of its suitability to our conditions, teachers and students (c) specially from the point of view of facility of examination.

(3) What may be called the merits of the question. The relative advantages and dis-advantages of Euclid as compared with the proposed Geometry considered with reference to their value (a) from point of information they give (b) of their value as agents of mental discipline.

During last 30 years Euclid has been a part of the Lower Secondary and High School curriculum of studies. Euclid's Elements of Geometry, Book I, was practically a compulsory subject for the Lower Secondary Examination under Mr. Grigg's scheme and as such it was taught in all ordinary schools. Later it was taught as an optional subject and continued in the curriculum from 1879 to 1899. The subject was removed

from the curriculum of studies by a notification issued by the Director of Public Instruction in November 1900. This removal was the result of the recommendation of the Educational Conference of 1899. Previous to the Conference there was a general dissatisfaction amongst teachers and managers with the state of Lower Secondary education and though as the invited opinions suggested various other important reasons might legitimately have been held to account for the unsatisfactory state of things still the Director of Public Instruction on the representation of a few educationists who were guided by the Head-masters of High Schools and who in their turn were guided by the Third Form Masters who thought that one subject removed from the curriculum would be more convenient to themselves and to their boys removed the subject from the curriculum of studies. This Conference was held in Dec. 1899. The Government notification approving of this removal appeared in November of the following year, 1900. Even those Managers who voted for the removal of the subject continued to teach the subject in their respective schools. Then the Managers requested the Director of Public Instruction to restore Euclid and Algebra to their old places in the curriculum. The Director acceded to their request by a notice dated 28th February 1901. Then the Director prohibited the teaching of the subject in the Lower Secondary classes although it was a subject for the Lower Secondary Examination.

The following facts may be adduced to show that Euclid's, Elements was a favourite optional subject with the boys.

(1) The G. O's recording the annual reports of the Government examinations contained the following "Geometry and Algebra among males and Needle work among females continued to be the most popular of the optional subjects."

(2) The following figures show the number of candidates that took up the subject as a optional subject.

E. Science		History of England	Geo. & Alg.
1897	297	438	7,561
1898	547	499	9,147
1899	425	481	8,542
1900	} Figures not available		
1901			
1902	247	268	3,244

As a result of the discussion of a meeting in 1902 the Madras Teacher's Guild invited the opinions of the Head masters of High Schools on the subject. Out of 28 replies received in answer 17 were against and 11 were in favour of retaining Euclid and seeing that the Teachers' Guild did not move in the matter a year later, I sent a similar query with a covering letter in which I explained my reasons against the prohibition I discussed in that circular the existing Lower Secondary curriculum of studies. The paper was shortly the following :—

(1) Unsuitable courses of study, a fault of the system of education in the Lower classes. English the medium of instruction and the over dominance of History & Geography.

(2) Consequent reduction in the number of subjects taught from six to three.

(3) Euclid's Elements practically compulsory in 1879. Euclid's Elements continuously taught from then till 1899.

Though "removed" in 1900, the subject continued to be taught till its teaching was prohibited in 1902.

(4) The question considered with reference to various classes of institutions.

(5) Negative justification for the retention of Geometry. If Geometry is to be removed, History of Great Britain and Ireland or Elementary Science possible substitutes. The former encourages further cram, the latter impracticable for want of qualified teachers.

(6) Positive justification. Geometry a necessary element of education as a means of intellectual discipline.

(7) The form in which Geometry is to be taught.

Positive justification for retaining Euclid. The mental discipline afforded by reasoned Geometry.

Negative justification. No definite result arrived in England after 30 years agitation to substitute any workable syllabus instead of Euclid.

Out of 85 replies received twice as many as those received by the Teachers' Guild—namely 55 or nearly two-thirds were in favour of the reintroduction of Euclid as against 27 or about one-third were against it. Three were neutral. The Head masters of Local and Municipal Schools were not consulted as they were prevented from giving opinions by virtue of their official position. Thus finding that 2 out of 3 head-masters were in favour of approaching the Director with a request to remove the prohibition I arranged in April 1903 with the secretaries of the Madras Teachers' Guild to open a discussion on the desirability of requesting the Director to remove the prohibition of the teaching of Euclid. Unfortunately no resolution could be arrived in at pursuance of the discussion since the attendance was poor.

The question was again discussed at the Annual Conference of the Madras Teachers' Guild Dec. 1903. No discussion followed and no resolution was adopted.

Hasty and illconsidered changes made in Mr. Grigg's scheme have disorganized the education in the Lower secondary classes, and as a consequence boys enter High school classes with deficient training. The effect of lowering of the standard is that the impressionable period of the boys in the lower classes is wasted without a sufficient grounding in easy subjects. Therefore it is imperative on us to note carefully the observation made by Dr. Gurudass Banerji in connection with the University Degrees that it is to our interest to see that the policy of lowering the standard is one which defeats itself and that our Standard should be set high if our education is to be of any value.

The faults of bad teaching have been attributed to the subject itself and thus it has been rendered unpopular. Some persons in England, impressed with these faults, have tried to do away with Euclid altogether and to introduce various syllabuses of their own which in their opinion are more suitable for purposes of teaching. But there are others who hold, and, I think rightly hold, that change, not revolution, is what is required. The weighty authority of the British Association Committee on the teaching of mathematics is with us to some extent; they say "an examining body might retain Euclid to the extent of requiring his logical order" (*School World*, October 1902). We may note that similar opinions were embodied in the reports made in 1873 and in 1876 "On the possibility of improving the methods of instruction in Elementary Geometry." Among the many grounds which may be urged in favour of the retention of Euclid as the basis of Geometrical teaching, we must remember that for purposes of examination it is necessary that there should be some common standard. It is futile to disregard this fact; if even in England teaching is guided largely by the requirements of examinations, it is still more so in India. Uniformity in the teaching of Geometry is essential

if we would avoid being landed in a disastrous muddle by a lack of cohesion. "Euclid is an excellent standard for work and examination and if it were abolished confusion would be the result." This fact has been intuitively recognized so that Euclid has continued to be the basis of Geometrical teaching; and reformers merely tilt against an imaginary windmill when they remark that Euclid's fame is no argument against reform. "After two thousand years Aristotle was abandoned as a preceptor in Natural Science. Boyle and Black, Davy and Faraday have cut us adrift for ever from the philosophy of the great stagyrite." The question naturally arises why has not Euclid been similarly "abandoned." The writer of the words above quoted lays the blame on fortune—an unsatisfactory answer. The truth is that Euclid taught "a science unchangeable in its principles as human reason"—a science which has never had to take a foot-step backwards, which has never asserted without proof, nor retracted a proved assertion.

The faulty methods in teaching Euclid have been pointed out and they are very few and they all find place in recent editions.

"There is no subject perhaps in our school curriculum which quite apart from all consideration of examination needs furnishes greater educational advantages than does the teaching of Euclid and the exercises of Geometrical deduction" says a writer in the School World March 1903, writing about the recent agitation in England to abolish Euclid as the basis of Geometrical teaching. As there seems to be some misapprehension as to the nature of that agitation we shall briefly set out the results of the discussion on the Teaching of Mathematics at the British association meeting held at Glasgow 1901. Out of the 18 speakers who took part in that discussion I find that of the 11 who refer to the subject of Euclid, no less

than 6 (five expressly and one impliedly) were in favour of retaining Euclid. One (Professor Everett) was apparently neutral. Only four were against Euclid. Again written replies to Professor Perry's queries are anything but uniformly favourable to Euclid's rival. I take the following extracts from the book entitled:—"British Association Meeting at Glasgow 1901. Discussion on the Teaching of Mathematics—edited by John Perry." Sir Philip Magnus wrote "But if the aim of mathematical teaching is rather brain development, accuracy in calculation and in measurement the acquisition of correct methods of reasoning or even a training that helps discovery then I am not sure that Professor Perry's "royal road" is altogether a safe one for ordinary children.....So far the purposes of general education a boy cannot be said to be learning mathematics by merely acquiring dexterity in the use of mathematical tables. I do not think Professor Perry meant all he said..... It must not be forgotten however that the process of teaching a child to *discover* is not a rapid method of arriving at results and may tend to retard rather than quicken progress as measured by worked chapters of our School Text Books." No doubt differing from Professor Perry in his proposals, he is himself against Euclid. Again several of the replies apply to the difficulty of obtaining proper teachers to follow the proposed course. Dr. J. Larmor writes in the following way. "The difficulty in regard to them (Professor Perry's proposals) is a practical one, there is the question of expense: to carry out such a proposal involves small classes and much individual attention to dull pupils, whereas the present more routine methods have been evolved largely in order to enable a single teacher to supervise a large class. There is the difficulty of obtaining a sufficient supply of elementary teachers who could be trusted to pursue a more unfettered course without exaggeration or wrong headedness." [Page 69.]

W. P. Workman says, "I am not clear that it (the proposed reform) lays sufficient stress on the training in exact thought which our present system certainly supplies, though possibly, probably even, at excessive cost in time..... He further observes "a good mathematician may be trusted to teach according to Professor Perry's proposals, and to get more out of it than he did from the older, because it will evoke far more interest. An indifferent mathematician would do much harm, because so much is left to his own, badly trained initiative" [Pages 76. 77]

W. D. Eggar writes "I feel that some of your proposed innovations might lead to disaster in the hands of a teacher not fully gifted with judgment." [Page 80.]

If this is so in England how much greater the difficulty must be of finding suitable teachers here scarcely needs pointing out. As Professor Horace Lamb said. "A good text book to replace Euclid is much wanted.....also it should be Euclidian in method if not in phraseology. If anything else is attempted a disastrous muddle will ensue to be followed after few years by a reversion to Euclid as happened once I think in Italy. I have little to say on the subject of the syllabus, except that, as a rule, I object to all programmes, and schedules, and "courses." A's "system" of teaching Chemistry, B's "system" of teaching Drawing or C's "system" of teaching the Piano, may be very good as a method elaborated by A, or B, or C, for doing his own work; but in other hands it is likely to become as mechanical and wooden as any other." [Page 92.]

Nor is evidence wanting that the abolition of Euclid has not been followed by any improvement in the instruction imparted. As says an American Professor "with regard to these hasty ways that sweep over the country, in mathematical teaching, one of them was one that appeared a few years

ago on Heuristic Geometry. We do not hear so much about that now. The enthusiasts thought they had solved the trouble with the geometry of the secondary schools by making an entirely new invention. I went to visit a school on purpose in a friendly spirit to be sure—to see how the thing worked, with one of the most enthusiastic teachers in New England. He claimed it was wrong that the children should take their ideas second-hand—that they should find them all for themselves. I think I state the matter fairly when I say that of a class of eighteen, ten boys and eight girls, there were four boys and two girls doing all the thinking, and the other twelve of the eighteen took their ideas entirely second-hand from the six. I watched the faces of the slower members of the class when a new question arose. They never thought of thinking about the thing, but waited to see what the others thought. I think that is a fair representation of the thing." (School Review Dec. 1903, University of Chicago Press). [Page 813.]

I have thought it proper to quote this long extract to show how the "heuristic" method of teaching Geometry (which some educationists wish to be introduced into this country) is working in other countries.

And again "In making substitution for the Geometry which we teach now, I have no agreement with the gentleman who spoke last evening, that there is very little educational value in Demonstrational Geometry, and I feel sure that most of you teachers in Geometry have not. We must bear in mind this thing, that when we substitute various things, like Mechanical Drawing and so on, for that kind of Geometry, we substitute a thing which is by no means equal in the present stages of the work. It may be equal one of these days, but it is not now. Some of the most hopeless boys I have in Geometry are boys who have had two years, perhaps, in Mechanical Drawing in various schools, and have done the drawing well, but it has given them no idea of

Geometrical forms" (School Review Dec. 1903, University of Chicago Press.) (Page 815.)

After 30 years agitation to abolish Euclid and substitute a suitable text book in its stead what is the result in England? As has been pointed out by Mr. Rupert Deakin M.A., it is erroneous to suppose that Euclid is no longer used in England. "Coming now to the Theoretical Geometry, I think that the idea that Euclid is no longer to be taught or used as a text book for the Cambridge Locals is quite erroneous. In the first place the Schedule distinctly says that the substance of certain theorems in Euclid must be known. Euclid's problems are replaced by Geometrical Drawing; but most of Euclid's theorems are retained, and more riders based on these theorems will probably be set. As a proof that Euclid is not to be abolished, the fact that the Pitt Press edition of Euclid is recommended by the Cambridge authorities as a text book may be mentioned. Teachers may rely on the Pitt Press Euclid, together with a book on Geometrical Drawing, as providing excellent preparation for the examinations. Again, in the specimen papers recently published, no less than five of Euclid's theorems are set both in the preliminary and in the junior paper. With regard to the omission of Euclid's problems, it is noticeable that the junior paper of 1901 contained none of Euclid's problems. The intention seems to be not so much to abolish Euclid as to ensure that Euclid shall be taught in a more intelligent and practical way." (School World, April 1903.) The same writer concludes the article by giving his advice to those teachers who have been working out courses of Geometry for their own classes. To all such he says "Do not change your system for the Cambridge Locals or any other examination. Modify and improve your teaching by reading these new books in order to get new ideas. Reformation, not revolution, is needed; a good teacher can appreciate good methods, and

should be ready to adopt them even when he himself does not originate them (School World April, 1903) In the course of the correspondence which recently appeared in the columns of the Madras Mail on the "Teaching of Mathematics" Mr. Weir Professor of Mathematics, Maharaja's College, Mysore, who was pleading for the cause of reform had to admit "whether a simple change in the method of teaching Geometry will do all that the reformers claim for it in producing a habit of accurate and consecutive thinking is another matter on which a pessimist may be allowed to express a pious doubt." On the face of the evidence above set out it requires but little pessimism to express that doubt. As I then pointed out though suggestions for reforms in our present methods of Geometrical teaching might be derived from those put forward by the reformers in England, it would be impracticable to adopt them in toto planned as they are (the reformers' courses,) for a totally different set of circumstances; they would not be suitable here. Moreover I pointed out in criticising a particular text book drawn up on some of the proposed lines of reform. "a truth which has recently been lost sight of, even among the educationists (who ought surely to be better informed) is, that Geometry is, or ought to be, taught in the lower classes mainly for the mental discipline it affords—a fact which has been forcibly impressed upon us by His Excellency Lord Ampthill in the course of his Convocation Address for the habit it tends to produce of accurate and consecutive reasoning. Any methods of teaching, therefore, which rob the subject of this disciplinary value must be condemned as unsatisfactory.....If we are to reform at all, the methods of reform we adopt must be the outcome of our own experience, of our successes and failures in the past, and must necessarily be controlled by our ability to carry them out, however desirable in themselves they might be." In the

course of the Madras Mail correspondence Mr. Weir pointed out that Baker and Bourne and Eggar's book are the most suitable books. Baker and Bourne is no doubt a conservative book. If Baker and Bourne will suit the modern requirements the following books will also suit—Harper's Euclid, Taylor's Euclid, Laying's Euclid, Mackay's Euclid. But Eggar's book is one of the reformers method. This book is considered not only by Mr. Weir and also by the Longman's Magazine as the most suitable to take the place of Euclid in our ordinary schools. I have examined how far Eggar's Practical Exercises in Geometry is suited to our schools. I do not think that it can be recommended as a text book for use in our schools, for in the first place the book attempts at once too much and too little. The first ten chapters of the book are devoted to the measurement of lengths, angles, areas and volumes. I cannot understand why Mr. Weir who is so impressed with the wastefulness, as he considers it, of the present system of teaching should recommend this book. It seems to me that all the ideas set forth in these initial chapters can be taught to pupils in the primary department. It would be more waste of time to teach much elementary things in the High school or even in the Lower secondary course. On the other hand chapters XXV to XXXI both inclusive treat of subjects not now taught even in the High school classes. Chapters XI to XXIV treat the properties of triangles, quadrilaterals and circles. It appears to me that it is a mistake thus to make a jumble of everything and present it to our boy's instead of introducing them to an orderly and sequent system of Elementary Mathematics somewhat on the general lines of the present system. Besides these intrinsic disadvantages there is the language difficulty if the first ten chapters were to be taught in the primary department. Moreover the masters of these classes are not generally of the capacity to teach the subject matter of the book in English. I think that in the

light of these remarks the book does not appear the desirable one that Mr. Weir implies it is, however suitable the book may be for an art school.

Again as regards the suggestion that Geometrical drawing might take the place of Geometry, the objections to such a course are too many for us to comprehensively notice here. But we may point out that besides the loss of the mental discipline incident to a course of reasoned Geometry there are the impossibility of getting competent teacher and that a teacher could efficiently supervise the work of a large class boys. If however it is thought desirable to preface the regular study of Geometry by a practical course calculated to impress upon the youthful mind the leading notions of Geometry then such a prefatory course can well be carried out, as has been pointed out above, in the five years of the primary department.

But if as suggested by the Senate of the Madras University for the consideration of the Government, "Modern Elementary Geometry, Practical and Theoretical" is to take the place of Euclid in the Matriculation curriculum the following important questions arise for consideration:—

- (1) The exact scope and nature of the Syllabus to be adopted.
- (2) The initial practicability and chances of success of such a reform having regard to our conditions, the intelligence of our pupils, the sizes of our classes and the capacity of our teachers.

As regards the theoretical portion if our University should follow a course similar to the one adopted by the Bombay University recently, it is to be observed that it is only Euclid thinned, Euclid rarified. The Syllabus contains nothing which any decent Text Book of Euclid does not contain and which our youths now learn. On the contrary it contains much less, too little in fact. The warning of Dr. Gurdas Banerji to the

reformers in his dissenting note to the Report of the Universities' commission not to lower the standard is assuming a prophetic value. If this is all the "Modernized Geometry" that is to replace Euclid one may well say with De Morgan "There never has been, and till we see it we never shall believe there can be a system of Geometry worthy of the name, which has any material departures (we do not speak of corrections or extensions or developments) from the plan laid down by Euclid."

The "practical" portion is much more objectionable. Not to repeat what has already been said that the substitution of a collection of constructions learnt by rule of thumb is incomparably inferior in educational value as a reasoned system and is in fact deleterious as encouraging cram and weakening the sense of the force of necessary relations, it must be seen that the scheme is calculated to fail from its impracticability. How in our large High School classes of an average strength of 40 is a teacher to supervise the working of "Practical Geometry" with ruler, set square, protractors and compasses? How can it but degenerate into a series of puzzle constructions? To propose such a scheme is to ignore one of the fundamental considerations which should influence recommendations to teach a subject in the lower classes viz. what may be called the degenerating capacity of a subject. Again where are our teachers? I yield to none in recognizing the desirability of children attaining a grounding in Practical Geometry and this work can and ought to be done in the Lower Secondary Classes. But the next question will be "Are Middle aged men unaccustomed to such work now to struggle with protractor and compasses to acquire at their time of life the neatness and mechanical dexterity without which constructions in Practical Geometry would be utterly valueless?" Neatness and precision are qualities essentially learnt from

practice rather than precept. A teacher who draws irregular squares, rickety triangles and elliptical circles (as without practice he of necessity must) is not the likeliest person to succeed in teaching "Practical Geometry" to his pupils. The proper solution of these difficulties is the teaching of Practical Geometry in the Lower Secondary Classes and the teaching of Theoretical Geometry in the High School Classes. Unless and until the Head Masters of High Schools meet in a conference to put the Lower Secondary Education in order many such difficult questions like the present will remain unsolved.

The following is the result of the replies sent by the Headmasters of High Schools to my printed circular dated February 1903 "On the desirability of including Geometry as an optional subject in the Lower Secondary curriculum of studies" :-

IN FAVOUR OF RE-INTRODUCTION, 55

1. Bobbili Samasthanum High School.
2. Ellore C. M. S. High School.
3. Narasapur Taylor's High School.
4. Bezwada C. M. S. High School.
5. Guntur Sanskrit High School.
6. Masulipatam Noble College. against teaching Euclid.
7. Nuzvid Sri Rajah's High School.* [in English]
8. Nandiyal S. P. G. High School.*
9. Nellore F. C. M. High School.
10. Madras Bishop Corrie's Grammar School.
11. „ Church of Scotland Mission College.
12. „ Doveton Protestant College.
13. „ Pachaiyappa's College.

* Would retain Euclid's Elements owing to the difficulties of selecting a suitable subject for the L. S. Examination.

14. „ St. Mary's College.
15. Vepery S. P. G. High School.
16. Mailapur San Thome Seminary.
17. Royapet Harris High School.
18. Mutyalpet High School.
19. Triplicane W. M. High School.
20. Chingelput Native High School.
21. Conjeeveram Pachaiyappa's High School.
22. Tiruvallur W. M. High School.
23. Gooty London Mission High School.
24. Madanapalle High School.
25. Tirupati H. L. G. M. High School.
26. „ Sri Mahant's High School.
27. Vellore Arcot Mission College.
28. „ Sri Mahant's High School.
29. Erode London Mission High School.
30. Salem London Mission High School.
31. Kumbakonam Town High School.
32. Mannargudi National High School.
33. Negapatam Wesleyan Mission High School.
34. Shiyali Lutheran Mission Central School.
35. Trichinopoly S. P. G. High School.
36. Pasumalai A. B. M. High School.
37. Ramnad S. P. G. High School.
38. Megnanapuram C. M. S. High School.
39. Pattamadai High School.
40. Palamecottah C. M. S. High School.
41. Alattur High School.
42. R. S. Lepper. Esq., M A., F. M. U. desires that the subject should be taught in the Vernaculars.
43. M.R.Ry. S. Radhakrishna Aiyar Avl., B. A., F. M. U.
44. R. Ch. High School Pittapuram.

45. R. B. A. M. M. High School, Bangalore.
46. Christian High School, Udipi.
47. Stanes High School Coonoor, Nilgiris.
48. St. Joseph's High School, Coonoor.
49. Diamond Jubilee High School, Gopichettipalayam.
50. Adayar High School and Orphanage.
51. A. E. L. Mission High School, Peddapur.
52. Victoria Memorial High School, Tanuku.
53. C. S. Boarding High School, Anakapalli.
54. Thondamandalam High School, Madras.
55. City High School, Madras.

AGAINST RE-INTRODUCTION, 26

1. Vizagapatam Mrs. A. V. Narasinga Rau College.
2. „ London Mission High School.
3. Coconada Pittapur Rajah's College.
4. Guntur A.E.L.M. College.
5. Madras Hindu Theological High School.
6. Triplicane Hindu High School.
7. Chittoor Board High School.
8. Punganur American Mission High School.
9. Erode Mahajana High School.
10. Mannargudi Wesleyan Mission High School.
11. Tiruvallur Board High School.
12. Shiyali Hindu High School.
13. Trichinopoly National High School.
14. Madura College.
15. „ Setupati Town High School.
16. Srivilliputtur C. M. S. High School.
17. Mangalore B. G. M. High School.
18. R. V. M. High School, Venkatagiri Town.
19. St. Antony School, Negapatam.
20. Raja High School, Siviganga.

21. St. Xavier's High School, Palamcottah.
22. Hindu High School, Srivilliputtur.
23. Kerala Vidhyasala, Virudupati.
24. Native High School, Palghat.
25. Brennun College, Tellicherry.
26. St. Antony's High School, Vizagapatam.

NEUTRAL, 3

1. Triplicane Madrasa-i-Azam.
2. Conjeeveram F. C. M. High School.
3. Cochin High School.

The Desirability of including Euclid as a Subject of Study in the Lower Secondary Curriculum.

In his note of dissent to the report of the Universities Commission Dr. Gurudas Bannarji truly observes that "the real improvement of University education must have its foundation laid in an improved system of school education," and he traces the faults of our system of education in the lower classes to (1) Unsuitable Text books and courses of study, (2) Inefficient Teaching, (3) Injudicious Methods of examination.

We propose now to consider the system of Lower Secondary Education prevailing in Madras in the light of these remarks, especially under the first head.

The two great faults which stand out in the scheme of study at present existing are (a) the fact that English is made the medium of instruction even from the First Form upwards though it was decided to the contrary at the Educational Conference of 1899,—the objection is not against English being taught as a Language subject but against its being made the medium of instruction in non-language subjects; (b) the undue prominence given to History and Geography, which are learnt in English, in the Curriculum.

As a result while the number of subjects taught has been gradually diminished we still find teachers dissatisfied and asking for a still further reduction.

The following table shows the process of reduction of the Curriculum:

FORMERLY	AT PRESENT.
<i>Middle School Examination.</i>	<i>Lower Secondary Examination. Educational Rules.</i>
All the subjects were treated as compulsory.	Some subjects are treated as compulsory and others optional; Geography and Indian History being treated as compulsory and Euclid optional.
Euclid being among them.	Geography and Indian History treated as optional * and Euclid and Algebra omitted.
The course prescribed in Algebra or universal Arithmetic as it is called more extensive than at present.	The course prescribed in Algebra less extensive than formerly.
Text books in both languages prescribed.	No Text books.

* These were treated as one subject under the Middle School Examination Scheme and are now counted as two subjects.

At the Conference of the Madras Teachers' Guild 1898, it was decided that Text books in the languages be prescribed and that candidates examined in them and that partial success be recognized.

Grants for the IIIrd Form are calculated upon the result of the Lower Secondary Examination.

In Art. 33 of the revised *Grant-in-aid Code* it is laid down that three optional subjects will be enough so far as the Lower Secondary Forms go.

So that the *Grant-in-aid Code* will be satisfied if a pupil passes in (1) First Language, (2) Arithmetic, (3) Geography, (4) Indian History, (5) Second Language, the last three being treated as optional subjects.

For securing the Lower Secondary certificate the pupil must pass in another optional subject, inasmuch as Geography and Indian History are treated as compulsory subjects. No grants are given for partial success. Since the removal of Euclid from the Curriculum either Elementary Science or the History of England has to be brought up by male pupils.

Thus it will be seen that there was a time when boys studied six subjects*, but now the masters, not satisfied with the cutting away of Text books, and subsequently of Euclid and Algebra, are trying to approach the Commissioner for the Government Examinations saying "if your honour will be pleased to revise the Lower Secondary Curriculum in the light of the revised *Grant-in-aid Code* it will really be a great boon conferred upon thousands of young boys whose brains are hitherto overburdened with the study of various subjects."

A reference to Appendix A will show that under the scheme of the Middle School Examination, Mathematics—that is to say Euclid Book I with Deductions and Algebra to the end of Fractions—was practically (that is, to all pupils except to those of recognized art, industrial or commercial schools) compulsory.

So for 20 years, till 1899, Geometry was taught in all ordinary schools. The teaching may not have been perfect but the subject was taught better than many other subjects.

At the time of the introduction of the Middle School Examination Scheme (in 1879) it was arranged with a view to the subject being studied with greater care and thoroughness that four, instead of three, years should be devoted to the study of Euclid. Under the Lower Secondary Examination Scheme the subject was taught

* Five, if Euclid and Algebra be taken together; it was even thought necessary to make a rule that "no male Candidate may at any one examination appear in more than seven branches." Now a difficulty is felt about teaching three,

generally in the Second Form; in some Schools even in the First Form. As the result of the recommendation of the Educational Conference of 1899 Geometry was removed from the Curriculum. Notwithstanding this it was continued to be taught until the Notification of the Director of Public Instruction in March 1902.

Previous to the December 1899 Conference there was dissatisfaction amongst teachers with the state of Lower Secondary Education, and though, as the invited opinions suggested, the faults we have mentioned at the opening of this paper might legitimately have been held, important reasons to account for the unsatisfactory state of things, the educationists in Conference assembled, chose to attribute it all to the *inoffensive* subject of Geometry and decided to remove it from the curriculum of studies. It cannot be said that all or even a majority of those actually engaged in the teaching of the subject were consulted at the time.

Curiously enough Geometry was only an *optional* subject so that there was no necessity to remove it. Probably the fact of the matter was that the educationists who advised the Director were guided by the general statements of their assistants that Euclid was a difficult subject to learn for boys of *tender age*. A more real way of relieving the burden of the boys would have been to make History and Geography, which were and are compulsory subjects, optional. The further history of the matter is instructive. The Government Notification approving the removal of the subject appeared only in November of the following year (1900). All this time the managers who had voted for the removal of Euclid allowed it to be taught in their respective schools. Only Local Fund and Taluk Schools under the direct supervision of Inspectors removed the subject in accordance with the views expressed by the Conference; and even after the Government Notification was issued, schools other than these continued to teach the subject.*

The reason assigned by the managers for so doing was that so long as Euclid was a subject under the Lower Secondary Curriculum they had to retain it as they were not able to find another suitable subject in its stead†, and several of them went so far as to request the Director to restore Euclid and Algebra to their old place in the Curriculum of the Lower Secondary Examination.

* In Madras Town, for instance, Geometry was taught in the Middle School Classes of the Christian College, the Church of Scotland Mission College, Wesleyan Mission College; Govinda Naicker's Middle School and the Hindu High School, Triplicane. In the Mofussil also with the exception of St. Joseph's Institution, Trichinopoly, the same was the case.

† So too a complaint was once made against the removal of Euclid from the Curriculum in the columns of the *Madras Mail* by "School Master in a fix." Boys appearing for the Lower Secondary Examination may also take up any one of the subjects of the Elementary Technical Examination, but this course is impracticable as the examination in that subject takes place at a later time.

The Director acceded to their request "pending the revision of the Lower Secondary Examination Notification," by a notice dated 28th February 1901. A year later this was abrogated by the following Notification:—"Managers of Schools are informed that Geometry and Algebra should not be taught in Forms below the Fourth though they continue to be subjects for the Lower Secondary Examination." During the interval of a year the subject was taught, as the Notice itself implies, so that in spite of the various vicissitudes in the history of the subject Geometry has been taught without intermission in the majority of schools. The fact is clear proof that of the optional subjects for the Lower Secondary Examination Geometry is the most suitable.

Now the Curriculum of studies has to be considered with reference to various classes of institutions. (1) Schools which are placed under the permanent system of grants and those that receive salary grants. These are periodically inspected by the Government Inspectors but have more or less freedom in following the Curriculum prescribed by the Educational Department. So also the Middle classes attached to High Schools; (2) Municipal and Board Schools which are under the direct supervision of Government Inspectors; (3) Those (by far the largest number) placed under the Grant-in-aid system under which passes in the Lower Secondary Examination are made the test for earning grants. The last two classes of schools must obviously feel the difficulty when a subject like Euclid which they have been teaching for a long time is prohibited.

If Euclid is to be removed, the following are the possible optional subjects: (1) the History of Great Britain and Ireland, (2) Elementary Science. To choose the former alternative would be to encourage more memory work. Usually History is learnt by boys in the Lower Secondary classes from catch-penny Analyses and Keys mechanically learnt by rote. It is more than doubtful whether boys have sufficient knowledge of English to learn History from a standard book. Science friends in their enthusiasm press forward the claims of Elementary Science. Whatever may be said in the abstract in favour of the subject, there are many practical difficulties in teaching the subject in our Lower Secondary classes. As a matter of fact science teaching even in the High School classes has been anything but satisfactory, and as the report of the Universities Commission says "this portion of the work of the Matriculation classes has proved most unsatisfactory—so unsatisfactory that the University of Madras has recently decided to alter its rule by combining the subject of science with those of History and Geography under one head. The reason which lies behind all this is the impossibility of securing that the teaching of science in schools, the majority of which are not equipped for this purpose shall be adequate as an introduction to the study of the subject in an

University course." The objection applies with greater force to the teaching of science in Lower Secondary classes which are not taught by Science Graduates and as the Godavari Teachers' Conference says, "the subject pre-supposes a command of English quite beyond the attainments of pupils of Lower Secondary standard. A reference to the list of failures in those subjects (History of Great Britain and Ireland and Elementary Science) last year (1900) clearly proves that they are rather hard nuts to crack as they involve a great strain on the brains of the pupils."

Nor can any other subject fitly take the place of Euclid whether the question is considered either from the point of view of the High School or the Lower Secondary classes.

As to the teaching of Euclid we think the allegation is untenable that boys in the Lower Secondary classes cannot understand it and the assertion that the propositions are learnt by heart, and other similar allegations point only to the need as the University Commission Report says, for a more rational system of teaching.*

Thus, while as we have seen, History encourages *cram*, and Elementary Science is impracticable, Geometry can be taught fairly well. It is astonishing that considering the fact that it affords a mental discipline to the boys, the like of which the study of neither the History nor the Elementary Science that can be taught in the Lower Secondary classes can possibly afford, the teachers should have seen fit to recommend its removal. From the time of Plato who wrote on the door of his house, "Whoso knows not Geometry let him not enter here," all thinking men have advocated the study of Geometry as an instrument of intellectual Education.

"It is something for men to learn what proof is, and what it is not: and I do not know where this lesson can be better learnt than in the schools of a Science which has never had to take one footstep backwards, which has never asserted without proof, nor retracted a proved assertion; a Science which, while ever advancing with human civilization, is as unchangeable in its principles as human reason."

"It is not therefore with the design of making Mathematicians of them, but to make them to learn to reason, that we advocate the teaching of Geometry to boys." If Geometry is to remain in the curriculum the question that next arises is in what Form is it to be taught—whether on the basis of Euclid or not. We advocate the former course. Nothing definite has been arrived at as the result of the agitation in England to find a suitable Geometrical text-

* The Report makes the remark with reference to the F. A. Examination; but it is equally applicable to the Lower Secondary Curriculum.

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book or Syllabus instead of Euclid. Speaking on this subject, Dr. Whewell said : —

“When a demonstrative Science has once been thrown into a rigorous logical form, it possesses a permanence and solidity which eminently fit it for being an element of intellectual education. Euclid's Elements are, to this day, at the same time the best instrument of mental discipline, which we possess. Almost all the alterations which have been made in that work, in more recent times, under the pretence of rendering it more easy, or more compendious, have tended to diminish its usefulness in our system of education. And a person writing an elementary book of Mathematics cannot aim at any higher success, than that his work should keep its ground and discharge its office as long and as well as Euclid's Elements of Geometry have done. Yet perhaps it may sometimes appear, both to teachers and students, that it is a waste of time and a perverseness of judgment to adhere to the ancient kind of Mathematics (Arithmetic and Geometry) when we have, in the Modern Analysis, an instrument, of greater power and range for the solution of problems; giving us the old results by more compendious methods; an instrument, too, in itself admirable for its beauty and generality. But to this we reply, that we require our *Permanent Mathematical Studies*, not as an instrument, but as an exercise of the intellectual power : that it is not for *their results* but for the *intellectual habits* which they generate, that such studies are pursued. To this we may add, as we have always stated, that, in most minds, the significance of Analytical Methods is never fully understood except when a foundation has been laid in Geometrical studies. There is no more a waste of time in studying Geometry before we proceed to solve questions by the Differential Calculus, than there is a waste of time in making ourselves acquainted with the grammar of a language before we try to read its Philosophical or Poetical Literature.”

Professor De Morgan said “There never has been, and till we see it we never shall believe there can be, a system of Geometry worthy of the name, which has any material departures (we do not speak of corrections, or extensions, or developments) from the plan laid down by Euclid.”

And the best proof after all is that, in spite of the agitation in England, the agitators are practically where they started.* We have no objection, as Professor De Morgan says to corrections, extensions or developments on Euclid's plan; such are those proposed in *School World*, October 1902, e. g., omitting I-7. proving I-8. by the direct method, &c., &c., in Book I. Such changes are to be found in almost every modern text-book and are such as every intelligent teacher makes while teaching the subject. The proposal

* See *School World*, October 1902.

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however has been made to make Geometrical Drawing take the place of Euclid. But besides the fact that by so doing we lose the all-important mental discipline afforded by reasoned Geometry, the difficulty remains of precisely fixing the scope and extent of the subject for purposes of study in the Lower Secondary classes. As we started by pointing out if Tamil and Telugu are made the *media* of instruction in a non-language subject like Euclid, the initial difficulty of mastering a foreign language is removed, and boys can readily understand the subject and derive from it to the fullest extent the mental discipline it is capable of imparting.

APPENDIX A.

NOTE I.

Under the Middle School Examination Scheme brought into force on the 17th October 1879, Mr. Grigg, the then Director of Public Instruction gave prominence to the Geometry teaching in the lower classes as will be seen from the following:—

For that examination the compulsory branches were 5.

- BRANCH I First Language (English),
II Geography and Indian History,
III Arithmetic,

and for the remaining two compulsory branches candidates were permitted to have the option of taking up any one of the following groups a, b, c, d, e:—

- (a) Branch VI Mathematics,
and
Branch IV Second Language.

[This group is as a general rule open only to pupils of ordinary schools or classes.]

- (b) Branch VI Mathematics,
and
Branch VII Introductory Science, &c.

- (c) Branch VI Mathematics,
and
Branch XXVII Mensuration,
and either
Branch XI Drawing,
or
Branch XII Modelling.

- (d) A group of subjects open only to pupils of recognized Art or Industrial Schools or classes.

- (e) A group of subjects open only to pupils of recognized Art or Industrial Schools or Classes.

Branch VI is Mathematics, Euclid Book I with deductions: and Algebra to the end of Fractions.

NOTE II.

	1897.		1898.		1899.		1900.		1901.		
	F. A.	Ma- tric.	F. A.	Ma- tric.	F. A.	Ma- tric.	F. A.	Ma- tric.	F. A.	Ma- tric.	
English	...	734	3315	744	3199	634	2626	528	3592	609	2922
Second Language.		351	898	429	1073	405	1034	371	1398	336	1352
Mathematics	...	843	2217	734	1873	962	2556	847	3197	984	3672
Science	...	665	1578	636	169	1038	3957	495	4163	648	3430
History	...	647	1678	591	1147	679	2165	571	3227	474	1860

The above figures give the number of failures in the F. A. and the Matriculation Examinations for the five years 1897-1901. Mathematics, it will be seen accounts for many failures. This is due, as Justice Guru Doss Banarjee observes, to the inefficiency of Mathematical Teaching in the lower classes.

The following is the result of the replies sent by the Headmasters of High Schools to my printed circular "on the desirability of including Geometry as an optional subject in the Lower Secondary curriculum of studies":—

IN FAVOUR OF RE-INTRODUCTION, 43.

1. Bobbili Samasthanum High School.
2. Ellore C. M. S. High School.
3. Narasapur Taylor's High School.
4. Bezwada C. M. S. High School.
5. Guntur Sanskrit High School.
6. Masulipatam Noble College.*
7. Nuzvid Sri Rajah's High School.*
8. Nandiyal S. D. G. High School.*
9. Nellore F. C. M. High School.

(MADRAS TOWN).

10. Madras Bishop Corrie's Grammar School.
11. " Church of Scotland Mission College.
12. " Doveton Protestant College.
13. " Pachaiyappa's College.
14. " St. Mary's College.
15. Vepery S. P. G. High School.
16. Mailapur San Thomé Seminary.
17. Royapet Harris High School.
18. Mutyalpet High School.
19. Triplicane W. M. High School.
20. Chingleput Native High School.
21. Conjeeveram Pachaiyappa's High School.
22. Tiruvallur W. M. High School.
23. Gooty London Mission High School.
24. Madanapalle High School.
25. Tirupati H. L. G. M. High School.
26. " Sri Mahant's Hindu High School.
27. Vellore Arcot Mission College.
28. " Sri Mahant's High School.
29. Erode London Mission High School.
30. Salem London Mission High School.
31. Kumbhaconam Town High School.*

* Would retain Euclid's Elements owing to the difficulties of selecting a suitable subject for the L. S. Examination.

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32. Mannargudi National High School.
 33. Negapatam Wesleyan Mission High School.
 34. Shiyali Lutheran Mission Central School.
 35. Trichinopoly S. P. G. High School.
 36. Pasumalai A. B. M. High School.
 37. Ramnad S. P. G. High School.
 38. Megnanapuram C. M. S. High School.
 39. Pattamadai High School.
 40. Palamecottah C. M. S. High School.
 41. Alattur High School.
 42. R. S. Lepper, Esq., M.A., F.M.U.
 43. M.R.Ry. S. Radhakrishna Aiyar Avl., B.A., F.M.U.

AGAINST RE-INTRODUCTION, 18.

1. Vizagapatam Mrs. A. V. Narasinga Rau College.
2. " London Mission High School.
3. Coconada Pittapur Rajah's College.
4. Guntur A. E. L. M. College.

(MADRAS TOWN).

5. Madras Black Town High School.
6. " Hindu Theological High School.
7. Triplicane Hindu High School.
8. Chittoor Board High School.
9. Punganur American Mission High School.
10. Erode Mahajana High School.
11. Mannargudi Wesleyan Mission High School.
12. Tiruvalur Board High School.
13. Shiyali Hindu High School.
14. Trichinopoly National High School.
15. Madura American Mission High School.
16. " Setupati Town High School.
17. Srivilliputtur C. M. S. High School.
18. Mangalore B. G. M. High School.

NEUTRAL, 2.

1. Triplicane Madras-i-Azam.*
2. Conjeeveram F. C. M. High School.

* Being a Government servant could not express an opinion.

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GEORGETOWN,

30th December 1906.

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From

S. RAJAGOPALACHARI, B.A.,

Assistant Master, Pachaiyappa's College,

M A D R A S.

(Joint Secretary to the Government of Madras,
Native Education,
Madras)

To

THE SECRETARY TO THE GOVERNMENT OF MADRAS,

Educational Department.

Sir,

I respectfully beg to draw the attention of His Excellency the Governor in Council to certain changes proposed to be introduced in the Matriculation Curriculum of Studies by the Madras University with special reference to "THE TEACHING OF GEOMETRY IN THIS PRESIDENCY."

2. For the last 30 years pupils in this country were learning Theoretical Geometry in ordinary schools (the basis of instruction - being Euclid) and Practical Geometry in the School of Arts and other Technical Schools (the basis of instruction being various Text Books). The Senate of the Madras University by its recent regulations has removed this distinction and further removed Euclid as a Subject of Study and substituted in vague terms "Geometry Practical and Theoretical" in its place and has drawn up a syllabus. The Senate has thus effected a reform in this Country which continues even to-day an unaccomplished fact in England after 30 years agitation.

3. In England an agitation for the reform of School teaching was started first by the Association for the Advancement of Science in 1860 and secondly by the Association for the Improvement of Geometrical teaching in 1871. In 1881 the Association widened its basis so as to include all branches of Elementary Mathematics and eventually in 1894 the name was changed into the Mathematical Association. The Geometrical Association made repeated but ineffectual attempts to per-

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suade University authorities to permit departures from Euclid's sequence. De Morgan, Lewis Carrol and Cayley openly avowed their preference for Euclid. The British Association was unable to carry out any reforms. The development of Engineering and particularly of the electrical branches necessitated the training of a body of students quick in action and decision. Perry's crusade against Euclid began in 1901 at the Glasgow meeting; still the Universities were reluctant to make changes. As there seems to be some misapprehension as to the nature of that agitation started by Professor Perry, I beg leave to point out the result of that discussion on the teaching of Mathematics. Out of 18 speakers who took part in that discussion 11 referred to the subject of Euclid, no less than six were in favor of retaining Euclid, only 4 were against it. Various syllabuses as are at present recommended by the Senate of the Madras University had been recommended by various authorities with what results the following Quotations will serve to show.

(a) Professor Horace Lamb said, "A good text book to replace Euclid is much wanted also it should be Euclidian in method if not in phraseology. If anything else is attempted a disastrous mud-dle will ensue to be followed after few years by a reversion to Euclid as happened once I think in Italy. I have little to say on the subject of the Syllabus, except that as a rule, I object to all programmes, and schedules, and "courses." A's "system" of teaching Chemistry, B's "system" of teaching Drawing or C's "system" of teaching the Piano, may be very good as a method elaborated by A, or B, or C, for doing his own work; but in other hands it is likely to become as mechanical and wooden as any other."

(b) W.D.Eggar wrote, "I feel that some of your (Perry's) proposed innovations might lead to disaster in the hands of a teacher not fully gifted with judgment."

(c) W.P.Workman said, "I am not clear that it (the proposed reform) lays sufficient stress on the training in exact thought which our present system certainly supplies, though possibly, probably even, at excessive cost in time He further observed "a good

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mathematician may be trusted to teach according to Professor Perry's proposals, and to get more out of it than he did from the older, because it will evoke far more interest. An indifferent mathematician would do much harm, because so much is left to his own badly trained initiative."

(d) Sir Philip Magnus wrote, "But if the aim of mathematical teaching is rather brain development, accuracy in calculation and in measurement the acquisition of correct methods of reasoning or even a training that helps discovery then I am not sure that Professor Perry's "royal road" is altogether a safe one for ordinary children. . . So far the purposes of general education a boy cannot be said to be learning mathematics by merely acquiring dexterity in the use of mathematical tables. I do not think Professor Perry meant all he said . . . It must not be forgotten however that the process of teaching a child to discover is not a rapid method of arriving at results and may tend to retard rather than quicken progress as measured by worked chapters of our School Text Books."

(e) The British Association Committee on the teaching of mathematics say "an examining body might retain ~~Eucl~~ Euclid to the extent of requiring his logical orders" (School World, October, 1902.).

4. Everywhere the drawing up of syllabuses is the order of the day. The Calcutta regulations closely follow those of Cambridge, and the Bombay and Madras follow those of Calcutta, but these attempts at grouping the propositions under different headings which any school-master of ordinary ability can do. It is no wonder that the want of a proper substitute for Euclid has been felt at home as in this Country. There as here also the financial difficulty of providing qualified teachers and the impracticability of giving effective teaching to large classes have been no less felt.

(a) J. Larmor writes in the following way. "The difficulty in regard to them (Professor Perry's proposals) is a practical one, there is the question of expense: to carry out such a proposal involves small classes and much individual attention to dull pupils, whereas

the present more routine methods have been evolved largely in order to enable a single teacher to supervise a ~~large~~ large class. There is the difficulty of obtaining a sufficient supply of elementary teachers who could be trusted to pursue a more unfettered course without exaggeration ^{or} of wrong headedness."

Thus after 30 years experience in England no workable and definite syllabus has been evolved so as to make the study of the subject uniform. The conclusion is irresistible that Euclid cannot be replaced as ^a branch of study by any syllabus of practical and theoretical Geometry in this Country where the qualified teachers of practical Geometry have yet to be trained.

5. During the last 30 years Euclid has been a part of the Lower Secondary curriculum of studies. ^{also} Euclid's Elements of Geometry Book I was practically a compulsory subject for the Lower Secondary Examination, from the seventies and as such it was taught in all ordinary schools, latterly it was taught as an optional subject and continued in the Lower Secondary Curriculum of studies from 1879 to 1899. The subject was removed from the Curriculum of Lower Secondary Studies by a Notification issued by the Director of Public Instruction in November 1900. The Government Notification approving of this removal appeared in November of the following year. The following facts may be adduced to show that Euclid's Elements was a favourite Optional Subject with the boys. The G. O's recording the annual reports of the Government Examinations contained the following "Geometry and Algebra among males and Needle work among females continued to be the most popular of the Optional Subject. The following figures show the number of candidates that took up this as an Optional Subject.

	ELEMENTARY SCIENCE.	HISTORY OF ENGLAND.	GEOMETRY & ALGEBRA.
1897	297	438	7,561
1898	547	499	9,147
1900 & 1901	FIGURES NOT AVAILABLE.		
1902	247	268	3,244

W.B.P

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With a view however to elicit the real state of opinion I forwarded a circular letter to the Head Masters of High Schools and other educationists throughout the Presidency soliciting their opinion on the question whether Euclid should or should not be re-introduced in the Lower Secondary Course. Out of 84 replies received about two-thirds 55 were in favor of the reintroduction while only three were neutral.

6. The Council of Native Education had taken the trouble to ascertain the views of the Head Masters of High Schools and other Educationists regarding the recent action of the Senate and I beg to append a summary of their replies. ^{out of 68 replies as many} ~~They are all unanimous to~~ ^{as 58 are for} retain^{ing} the existing order of things on the grounds mainly:-

(a) "Proposed change as regards Matriculation Geometry will assuredly introduce indefiniteness as to the scope of study and will certainly be responsible for many failures in the Matriculation Examination."

(b) "Practical Geometry is a Technical Subject and may stock the memory ^{with} the useful formulae and rules which the pupil need not prove to himself ^{by} systematic reasoning. It can never be a substitute for Euclid which aims at giving that training to the mind which would be serviceable in the logical study of every other subject."

(c) "Since no standard authority exists in Modern Geometry I consider the attempt to replace Euclid as premature."

(d) "Euclid teaches a man whether a conclusion follows from the premises given. Its value as a mental discipline is incalculable. Practical Geometry, if it does not contain much of Euclid, is an inferior substitute; if it does, is a superfluous luxury."

(e) "Euclid must continue to be the basis of instruction in Geometry with a view to secure uniformity in teaching it and to avoid indefiniteness in the curriculum in that subject."

(f) "Euclid continues to be the basis of instruction in Elementary Geometry for the Oxford, Cambridge, Dublin, Aberdeen and even for London University Examinations, I think it should be so for Madras also."

(g) Euclid should be retained, because there is no book better adapted for mental training."

(h) Practical Geometry, while giving a good training to the eye and the hand does very little by way of developing the intellect and the reasoning faculty of the student. The High Schools as they are manned now, have not many teachers who can do justice to new subject if entrusted to them."

(i) Euclid as an intellectual developer has no rival; and that it can never be ousted from the School Curriculum without causing irreparable loss."

(j) If Euclid is to be replaced by any other book, there has not been a book treating of the subject, which though very much suited to for Art and Technical Schools, is so far suitable for schools for general education."

A SUMMARY OF THE ARGUMENTS.

7. a. Whatever be the conditions in Germany and in France, which must have rendered necessary some substitute for Euclid this Country is not prepared for such a change.

b. For the Oxford, Cambridge, Dublin, and even for the London University Examinations Euclid continues to be the basis of instruction in Elementary Geometry.

(As a proof that Euclid is not to be abolished, the fact that the Pitt Press Edition of Euclid is recommended by the Cambridge authorities as a Text Book may be ^{mentioned} ~~mentioned~~. Rupert Deakin, M.A.)

(c) For the preliminary Examination conducted by the Madras Civil Engineering College recently Euclid was the Examination Text Book.

(d) Euclid continues to be the basis of instruction for boys in European Schools. The Educational Department apparently does not view the Senate's revolutionary changes with great favor.

(e) No substitute for Euclid has been found in England after 30 years agitation. Present day publications have yet to establish a name. Some of the books that have recently been published with the object of providing such a substitute however suitable they may be for Art and Technical Schools are unsuitable for ordinary schools.

(f) The syllabuses issued by the Calcutta, Bombay and Madras Universities under the new University Act contain nothing which any decent Text Book of Euclid does not contain so far as theoretical Geometry is concerned; on the contrary they contain much less.

(g) Practical Geometry will no doubt train the hand and the eye, but it is much more suitable for Lower Secondary Classes. Effective teaching of Practical Geometry is impossible with our large classes.

(h) Such teachers as we have cannot be familiar with any syllabus that may be newly elaborated. It is essential that the foundations of the subject ought to be laid by competent hands.

(i) Euclid was an extremely popular subject with Lower Secondary Candidates as an optional subject before the prohibition of its teaching in 1902.

(j) The numerous failures in the Matriculation Examination in Science for many years and in History and Geography during recent years are largely due to want of definiteness in the scope and extent of the Curriculum in those subjects. The proposed change ⁱⁿ Geometry teaching will introduce a similar indefiniteness and may be responsible for further failures.

(k) The ^{majority of} ~~large~~ invited opinions from the Head Masters of High Schools ~~is~~ against the Senate's proposal.

8. I beg leave to send for your kind acceptance the following printed papers from which I have taken extracts.

(a) Circular letter of the Council of Native Education to the Head Master of High Schools, dated 12th June 1906.

(b) My circular letter to the Head Masters of High Schools, dated 26th November 1906. (This letter is not yet circulated since the schools are all closed.)

(c) Replies from the Head Masters of High Schools and other Educationists to the circular letter of the Council of Native Education, dated 12th June 1906.

(d) Geometry teaching in this presidency.

(e) Desirability of including Euclid as a subject of study in the Lower Secondary Curriculum of studies.

9. In conclusion I am of humble opinion that the Senate's action in this respect is revolutionary and harmful. The Senate has accepted the recommendations of the Committee presided over by Mr. Allen. Under these circumstances I beg of His Excellency the Governor in Council to withhold assent to this part of the Senate's proposal since the regulations as forwarded by the Senate are merely recommendations, which His Excellency's Government are not bound to accept.

I beg to remain,

Sir,

Your most obedient and humble servant,

S. Rajagopalachari

Assistant Master, Pachaiyappa's College,

MADRAS.

*(Joint Secretary to the Government of Madras)
Native Education
Madras*

(7) The syllabus issued by the Government, Bombay and Madras Universities under the new University Act contain nothing which any decent Text Book of Euclid does not contain so far as theoretical Geometry is concerned; on the contrary they contain much less.

(1) Practical Geometry will no doubt train the hand and the eye but it is much more suitable for Lower Secondary Classes. Extensive teaching of Practical Geometry is impossible with our large classes.

(2) Such teachers as have any of the familiar with any syllabus that may be newly elaborated. It is essential that the foundations of the subject ought to be laid by competent hands.

(3) Euclid was an extremely popular subject with Lower Secondary Candidates as an optional subject before the introduction of the teaching in 1902.

(4) The numerous failures in the Matriculation Examination in Science for many years and in History and Geography during recent years are largely due to want of definiteness in the scope and extent of the curriculum in these subjects. The proposed changes in Geometry will introduce a wide field of knowledge and will be possible for further failures.

(5) The Senate invited opinions from the Head Masters of High Schools in 1902 against the Senate's proposal.

6. I beg leave to refer for your kind perusal the following printed papers from which I have taken extracts.

(a) Circular letter of the Council of Native Education to the Head Master of High Schools, dated 12th June 1902.

(b) My circular letter to the Head Master of High Schools, dated 24th November 1902. (This letter was not yet circulated since the schools are all closed.)

(c) Replies from the Head Masters of High Schools and other Educationalists to the circular letter of the Council of Native Education, dated 12th June 1902.

(d) Geometry teaching in this country.

(e) Desirability of teaching Euclid as a subject of study in the Lower Secondary Curriculum of Education.

NOTES.

W. M. W. 16-10-17

In conclusion I am of opinion that the Senate's action in this respect is revolutionary and hateful. The Senate has rejected the recommendations of the Committee presented over by Mr. W. M. W. Under these circumstances I beg of Mr. W. M. W. the Governor in Council to withhold assent to this part of the Senate's proposal since the regulations as forwarded by the Senate are merely reformulations, which the Executive's Government are not bound to accept.

I beg to remain,

Sir,

Your most obedient and humble servant,

W. M. W.

W. M. W.

W. M. W.

W. M. W.

29
order with 8000.16
10.1.07 8
Ed

C. No. 8. From the M.R.R. Rajagopalachari No. " , dated 30.12. 1906.

SUBJECT.

Re: The University Regulations.

A draft order on the lines of the H. M's orders on page 3 of the notes in linked file I is submitted below for Approval.

7/1/07
7.1.07

9/1/07

READ AGAIN G.O., No. 841, dated 27. 12. 1906.

190

READ ALSO:—

C. No. 8 From the M.R. Rajgopalachari, No. -, dated 30. 12. 1906.

ORDER.

P.S.

No. 16, dated 10. 1. 1907

Recorded with the remark that
the memorialist should address the University.
~~2. The University should be addressed.~~
on the matters referred to in his memorial

7/1/07

8/1/07

7.

Despo 10/402
The memorialist (41 New Street)

4 E.T.

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inadequate

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28

Received by the University of Toronto

10/1/01

First copy sent to Press.

Returned for signature.

Despatched in print.

NUMBER OF COPIES REQUIRED. Order complete. 25
Letter only.
Order complete with Letter.

READ AGAIN G.O., No. 190

DATED

WARRANT No.

8 A

Proof please
18/11/01

ENCLOSURES TO G. No.

A

ORDERS OF GOVERNMENT

A

LETTERS TO GOVERNMENT

STATEMENT WITH DITTO

PAGES NOT FURNISHED, BEING MEANT FOR DEPARTURE IN ORIGINAL.

A.B.

A = Print in full.
B = Not to be printed.
P = Print abstract only.
Q = Print heading only.