The Argument from Matriculation Used by Proprietors of Victorian Secondary Schools Around 1900

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In this paper, we analyse data from the University of Melbourne's Matriculation examinations around 1900. The analyses reveal that many schools cleverly developed and applied strategies so that their Matriculation results would appear to be more impressive than they really were. After "excellent" results had been achieved, the schools advertised their Matriculation "successes" in ways which suggested that the schools' "outstanding" results derived from high-class teaching. In this paper, we argue that these tactics generated artificially high "standards", and that throughout the twentieth century there was a tendency to try to maintain those standards.

Introduction

At the end of the nineteenth century arithmetic, algebra, Euclidean geometry, and trigonometry—but not calculus—formed an unofficial canonical secondary-school mathematics curriculum in all Australian colonies. Some students in secondary schools were prepared for university-entrance examinations conducted by the colonial universities, and courses of study prescribed for those examinations were like those prescribed for students of comparable age in Great Britain who were preparing to enter British universities (Clements, 1979). In Great Britain, however, students intending to proceed to universities tended to remain in school for one or two years longer than colonial students intending to enter local universities—the most typical age for students entering British universities was 19 but, for Australian universities, it was 17. As William Webster, head of Mathematics at Christ's Hospital, in London, told the Taunton Royal commissioners in 1865, the best British schools carried boys into third-year university mathematics, and the best students almost completed most of the mathematics required for a mathematics degree at the University of Cambridge (Great Britain, 1865, see Question 8203).

During the nineteenth century, well-to-do colonists in Australia often wanted their children to qualify for registration with British professional societies (e.g., in Medicine, Law, and Engineering). As a result, Australian colonial universities took steps to ensure that 17-year-old students met minimum qualifications for entrance to major British universities. This resulted in Australian universities defining post-Matriculation courses, and students who passed the local university-entrance examinations at the "pass" level could remain at school, for an additional one to four years, preparing for honours-level post-Matriculation examinations (Clements, 1979).

Post-Matriculation Mathematics in Schools in Victoria in the Early 1900s

Around 1900, the standard of work in post-Matriculation classes of some of the schools in Victoria was very high. In 1884, at Presbyterian Ladies' College (hereafter PLC), for example, 15-year-old Mathilde Monash—a sister of John Monash, who would become a well-known Australian engineer and soldier—sat in post-Matriculation classes and gained honours in French, German, English and Geometry, as well as passes in Algebra, Arithmetic and Physics (University of Melbourne, 1884). She was placed third on the first-

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class honours list for Modern Language, and seventh on the second-class list for Mathematics. In 1885, she again gained places on the same Matriculation class lists, securing second place on the first-class honours list for Modern Languages, and third place on the first-class list for Mathematics. Even though the minimum age for entry to the University at that time was 15 years, and she was now 17, she returned to PLC in 1886, and gained the exhibition (i.e., first place, on the first-class honours list) in Modern Languages. Motivated by the desire to become the first female to secure the Matriculation Mathematics exhibition, she returned to school in 1887, but only obtained equal fifth place on the first-class honours list in Mathematics. In 1889, Ellen Whyte, also a PLC student, gained a place in the first-class honours list in Mathematics. The next year she returned to school and succeeded in creating history by gaining the Mathematics exhibition. One PLC historian wrote: "Great was the jubilation, and many the comparisons of Ellen Whyte with Agneta Ramsay, the English girl who had taken the first place in the Mathematical Tripos at Cambridge" (Fitzpatrick, 1975, p. 105). Whyte's success caused many to question the traditional assumption that women were not as capable as men at mathematics. It also drew attention to the fact that some students returned to school to attempt to win exhibitions even after they had gained first-class honours at Matriculation. This helps to explain why PLC could claim, in an advertisement in 1899, that its students were "carried on to M.A. pass standard in six departments" (Presbyterian Ladies' College, 1899, p. 11).

According to University of Melbourne (1900) Matriculation records, 30 post-Matriculation students presented for honours in Mathematics in November 1900 and, of those, 25 were from the following schools: Melbourne Church of England Grammar School (one student), Methodist Ladies' College (three students), Presbyterian Ladies' College (three students), Scotch College (five students), South Melbourne College (two students), University High School (five students), and Wesley College (six students). Honours Matriculation mathematics classes were mainly offered in the colony's largest, most prestigious colleges.

In fact, the practice of offering free tuition in post-Matriculation classes to students who were already qualified to enter university continued in Victoria until about 1970. "Top" secondary schools would offer scholarships to brilliant students, to encourage them to remain a year or two longer at school before they proceeded to the University of Melbourne (or to some other university). The practice was discontinued in modern times after it was decided that there should be a penalty applied to such students when entrance-scores to universities were calculated. Before that, however, talented young first-up students presenting for Matriculation mathematical subjects were forced to compete against persons who had already obtained honours in Matriculation mathematics. Not surprisingly, the repeaters tended to do better than the younger, first-up students. Subsequently, at the University of Melbourne, students in prestigious "honours" mathematics classes (which studied more advanced courses than, the "pass" mathematics classes) tended to be from well-connected families which had chosen to allow their children to spend more than one year in twelfth-grade mathematics classes. Artificially high standards for secondary-school mathematics were thereby established—and there were leading figures within the mathematical community who wanted to see the old "standards" maintained.

Few parents in Victoria in 1900 would have realised that most of the highest Matriculation honours in mathematics were gained by students who had devoted between two and four years to specialised post-Matriculation study. Typical prospective parents would probably have regarded the fact that students from a certain school regularly

obtained high honours as providing overwhelming evidence that that school had very good academic standards. Those parents would have been unlikely to know that at many smaller schools, post-Matriculation classes were an economic impossibility and that students from those schools could not have been expected to obtain the top honours.

A Mathematics Professor's Views on Standards Expected of Incoming University Students

In 1903 Edward J. Nanson, Professor of Mathematics at the University of Melbourne between 1875 and 1922, gave evidence before a Royal Commission inquiring into the state of the University. Nanson, a University of Cambridge graduate, had been Matriculation examiner in Algebra for the University of Melbourne for many years, and the commissioners would have expected him to have a good idea about what might reasonably be expected of secondary-school mathematics students. The following excerpt from Nanson's evidence before the Royal Commission throws light on relationships between school and university mathematics in Victoria at the time. Most of the questions were asked by Theodore Fink, who chaired the Commission.

Fink: Have you formed any ideas as to how much mathematics, without cramming or undue forcing, commencing at appropriate ages, a boy ought to know when he comes up in his seventeenth year?

Nanson: I think when a boy comes to the University at that age he ought to know practically all that is required in Pure Mathematics, Part I.

Fink: Would that be fixing a higher standard than other universities or other secondary schools?

Nanson: I am not familiar with secondary education or school work. What opinion I can give is based on the results of my own students. It seems to me a large percentage are able to get through Pure Mathematics I without coming to lectures. I think in a great many cases they must have done pretty well enough at school to get through.

Fink: In 1902, at the University of Melbourne, 57 passed out of 79 who went up for Pure Mathematics I. Of those 57, only 20 thought fit to attend lectures. Either the lectures were not suitable, or they were coached outside, or the subject was too easy?

Nanson: Yes.

Fink: Is there much difference between Pure Mathematics I at the pass standard and the honour standard in the Matriculation examination?

Nanson: There is a considerable difference. There is a very radical difference between honour work and pass work in examination.

Commissioner Black: What is the difference between pass and honours in regards to Matriculation?

Nanson: The range in Algebra, that is the book work, is practically the same in the two, but the questions that are set for honours work in Matriculation are such that the pass men in Pure Mathematics I would not have the slightest chance of doing.

Commissioner Black: The present honour standard in Matriculation is a higher standard than the first-year pass?

Nanson: Yes. The standard in Geometry and Trigonometry is not as high as it is in Algebra.

Fink: I see Pure Mathematics is essential to the degree of B.A.?

Nanson: Yes.

(University of Melbourne, 1904, evidence of E. J. Nanson, pp. 129–130, Questions 1895–1907)

Questions on the University of Melbourne's Matriculation honours Mathematics papers were certainly difficult. Question 3 on the Geometry and Trigonometry honours paper for the November 1902 illustrates that point. The question stated:

If $L = qr + p(q \cos B + r \cos C - p \cos A)$,

$M = rp + q(r \cos C + p \cos A - q \cos B)$,

$N = pq + r(p \cos A + q \cos B - r \cos C)$, and

$P = q^2 + r^2 + 2qr \cos A$,

Prove that $\frac{PL + MN}{qr} = (p \sin A + q \sin B + r \sin C)^2$, *A, B, C,* being angles of a triangle.

That question would challenge top mathematics students in schools of any era. The same level of difficulty could be found in questions on all the honours mathematics papers.

The Argument from Matriculation in Victoria, Around 1900

Secondary education in Victoria around 1900 was almost entirely a free-enterprise affair. Anyone wishing to teach in a private or Church-related school was not required to possess any academic or professional qualifications. The colony had never had a teacher-education institution which was directed at prospective secondary teachers, and there was no system of checks on the ways in which schools were run, no government regulations relating to buildings, and no system of inspection of secondary schools. Provided secondary teachers kept to the law, and proprietors filed their annual reports showing the numbers of students in their schools, they could teach what they liked, in whatever ways they liked. There were no government restrictions on the fees that the proprietors could charge parents.

Given this unregulated state of affairs it is not surprising that during to period 1856–1905, when the University of Melbourne's Matriculation served both as the entrance examination for the University and as a public examination for students wishing to enter professions, secondary-school proprietors, teachers, parents and University teachers came to regard results at Matriculation as the most appropriate measuring stick against which the quality of work done in a secondary school could be assessed. Thus, arose what was called the "argument from Matriculation"—that is to say, the argument that the quality of educational experiences offered by a secondary school could be measured by studying the performances of students from that school on the Matriculation examination (see The Argument from Matriculation, 1904, p. 19).

Tactics Used by School Proprietors to Boost their Arguments from Matriculation

A South Melbourne College example. Perhaps the best example of how the argument from Matriculation was presented by school proprietors came in the form of a full-page advertisement for South Melbourne College (SMC), a private school, which appeared in the *Australasian Schoolmaster* of January 1897. The Principal of SMC, John Bernard O'Hara, was a well-regarded Australian poet, and his flair for colourful combinations of words was evident in the advertisement:

SOUTH MELBOURNE COLLEGE

A Splendid Success
A Phenomenal Year

In smaller print, immediately below this heading, was:

> The South Melbourne College has now firmly established its reputation as the premier school in Victoria. The university results for the past four years exceed in brilliance those of any other period of the College, and vindicate the claim of the South Melbourne College to rank as the leading college in the colony.
>
> During the past eight years the College has matriculated over 170 pupils, gaining first-class honours in Mathematics, Physics and Chemistry, as well as numerous scholarships at Ormond College, Melbourne University, and exhibitions under the Education Department.
>
> For the past five consecutive years this College has held the first or second place in the mathematics honours lists at Matriculation.

The remainder of the page was filled with details of results obtained by South Melbourne College students at the November Matriculation examination of 1896. Some of the points made were

1. The South Melbourne College gained the highest number of:
   (a) Passes, viz. 27 (no other school gained more than 24).
   (b) Exhibitions, viz. 3 (no other school gained more than 1).
   (c) Places in class lists, viz. 13 (no other school gained more than 10).
   (d) First and Second class honours, viz. 11 (no other school gained more than 8).
2. The College won the Mathematics exhibition for the third consecutive year, and the Physics and Chemistry exhibition for the second consecutive year.
3. The College gained places in five out of the six class lists. Viz. in (a) Mathematics, (b) Classics, (c) English and History, (d) French and German, (e) Physics and Chemistry. No other college gained places in as many lists.
4. The College presented the only girl who gained honours in Physics and Chemistry, and in the history of Matriculation no girl from any other school has made the class lists in Physics and Chemistry.

(South Melbourne College, 1897, p. 133)

What parents, looking for a suitable secondary school for their child, would not have been impressed by the details provided in that advertisement?

But, if the same parents who read this South Melbourne College advertisement had also read a supplement to the 1896 *Annual Report* of another Melbourne secondary school, University High School, they would have found that Thomas Palmer, the Principal of that school, was also making persuasive claims about the successes of his students at the same November 1896 Matriculation examination. Palmer claimed:

> The number and value of the scholarships and exhibitions gained at the affiliated colleges of the University eclipse anything hitherto recorded in the annals of secondary school education in Victoria. … At the Matriculation examination, 24 of our pupils passed, making a total of 31 for 1896, thus giving us the highest record in the number of passes at Matriculation.

(University High School, 1896, p. 1)

Heads of other secondary schools in Victoria were not willing to allow J. B. O'Hara and Thomas Palmer to fight it out between themselves. An advertisement in the *Argus* in January 1897 for Presbyterian Ladies' College (PLC) pointed out that over the past 16 years 310 PLC students had passed Matriculation, 16 had gained exhibitions, 62 first-class honours, and 50 second-class honours (Presbyterian Ladies' College, 1897). Another advertisement, for Scotch College, reported that for each of the past six years a student from Scotch College had gained the Classics exhibition, and that 17 of the 24 first-class honours given in Classics for that period had gone to Scotch College boys (Scotch College,

1897). *The Camberwell and Hawthorn Advertiser* (5 January 1900) stated that for the period 1893–1898, 116 Hawthorn College boys had passed the Matriculation examination, "this being 18 more than other boys' school, public or private, in the colony, except one" (Hawthorn College, 1900, p. 3).

Each of the above claims was true. The advertisements testified to the fact that heads of schools knew how to massage Matriculation results so that they appeared to indicate that a school was, academically and pedagogically speaking, a centre of excellence. However, our analyses of three major data sources revealed that the apparently superior results of the schools named above may not have had much to do with the quality of instruction given in the named schools. These data sources were (a) the Matriculation examination records of the University of Melbourne (held in the University's archives); (b) a folder held by the Ministry of Education containing details of all scholarships given by Victorian secondary schools to state-school pupils between 1894 and 1900; and (c) annual reports of University High School from 1896 to 1900.

Influence of scholarships on Melbourne Matriculation results around 1900. Between 1898 and 1900, inclusive, University High School (UHS) students gained 24 places on Matriculation class lists, including 10 first-class honours (Matriculation entries and results for the University of Melbourne). No other school in Victoria gained as many first-class honours during the same period. What was never known, generally, however, was that 23 of the 24 honours were gained by students on full-fee-paying scholarships awarded by the proprietors. If one considers the number of passes at Matriculation examinations obtained by UHS students, one finds that of the 26 students who attempted to pass the Matriculation examination as a whole, in November 1900, 17 held full scholarships. Of the 17 UHS students who succeeded in gaining an overall pass, 14 held full scholarships.

Five of the seven students from Wesley College who obtained honours at the November 1900 Matriculation examination were former state-school pupils who had won scholarships to the College (see Scholarship Folder, Victorian Department of Education, 1896–1900, and "Entries-Results" for the University of Melbourne's November 1900 Matriculation examination). In fact, 23 of 48 Wesley College candidates for the November 1900 examination held scholarships, as did 8 of 14 College students who gained an overall Matriculation pass. But, 27 of the 48 Wesley College students who attempted to secure Matriculation passes failed to do so, and at least 11 of the failing students held scholarships. At South Melbourne College, 24 of 43 students who attempted an overall pass succeeded in doing so, and of those 43, 12 had previously gained overall passes.

Sending up very young students to boost the number of Matriculation passes. Another tactic used by some proprietors to swell the number of Matriculation passes gained by their students was to send up students who were 12, 13, or 14 years of age. Although over 90% of students who attempted an overall Matriculation pass in 1900 were 15 or more, and over 70 percent were 16 or more, students of any age could present for the examination.

Allowing only "recommended students" to present for Matriculation. Some schools did not approve of their students sitting for the Matriculation examination under the umbrella of the school unless they had been "recommended" to do so by school authorities. In their advertisements, these schools drew attention to the *percentage* of students *whom they had recommended* who passed the Matriculation examination. Thus, for example, the head of Methodist Ladies' College (MLC), pointed out that 13 of the 14 MLC students who attempted to pass the November 1899 Matriculation examination succeeded in doing so ("Methodist Ladies' College", 1900). Seventeen of the 24 students ("70.8 percent")

from University High School (UHS) who attempted to pass the November 1900 Matriculation examination managed to do so—largely because parents of UHS students who had been prepared for the examination but were deemed to be "unlikely to pass" were informed that "it was not wise for their children to present for the examination" (University High School, 1901, p. 9). In 1900, this policy of "do not present unless recommended" was in place in many of Victoria's secondary schools (e.g., at Grenville College, in the City of Ballarat—see the *Ballarat Courier*, 17 December 1900, p. 4).

Disguising the actual results of a school by publishing "honours lists". Another tactic used by heads of schools in order to give an inflated impression of their schools' Matriculation results, was to publish "Honour Matriculation lists" which contained only the names of students who had passed the Matriculation examination as a whole (see, e.g. the *Xavierian, 1898–1902*; see also, *Ballarat Courier,* 17 December 1900, p. 3, for reports on Grenville College and St. Patrick's College; and Scotch College, *Report*, Christmas 1901, pp. 15–16). The average parent was not aware of what the honour lists entailed and might have thought that the lists included the names of all of the Matriculation candidates from a school—because, after all, the lists often showed Ns (i.e., fails) on individual subjects, as well as Ps (passes) and Hs (honours). Typically, honour lists suggested that schools had gained better Matriculation results than what had, in fact, been the case.

Summary, and Concluding Comments

Around 1900, very few, if any, of those who based their assessment of the efficiency of Victorian secondary schools on Matriculation results would have been even remotely aware of the multitude of factors which, taken together, would have cast doubt on the validity of that criterion. Parents were not in a position to know that results for some schools were much influenced by the performances of post-Matriculation students and former state-school scholarship winners. They would not have been aware, either, that many of the Matriculation passes counted by the proprietors of larger schools were gained by students whom they had pressured to sit for the Matriculation examination two, three, four, and even five times. Again, statistics were not available to the public at that time to show how some proprietors prepared and presented all students in their schools who had any possible chance of passing Matriculation, irrespective of the ages of the students concerned, in order to get as large a number of passes as possible. Objective statistics which showed the number of failures by pupils attending the different schools were not officially reported. At the other extreme, parents had no way of judging the efficiency of schools at which proprietors used the "recommendation technique" so that the highest possible *percentage* of passes might be obtained by students from their schools. And, even if interested persons had been aware of most of the techniques that have been mentioned, they might still have been misled by a detailed "honour list" which appeared to list the results of all students at a school who had presented for a Matriculation examination but which, in fact, contained mostly the results of those students who had done well in the examination.

Proprietors who used any of the above-mentioned tactics rarely let the interested public know how much their tactics influenced the overall results. The tactics were designed to deceive—although, often, the proprietors and principals did draw attention to the fact that *other* "well-performing" schools were using dubious tactics (see, for example, the advertisement for Glenthorpe College, Ascot Vale, in *Argus*, 28 January 1899, p. 14). Proprietors used all their ingenuity in their reports and advertisements to make their

schools' Matriculation results appear to be second-to-none so far as quality was concerned. However, an examination of arguments used and statistics quoted, reveals that it was much easier for principals and proprietors of larger schools to "engineer" apparently respectable Matriculation results than it was for principals and proprietors of smaller schools. That raises an interesting question: Was the instruction given in larger schools generally better than that given in smaller schools? It is at least clear from the analyses presented in this paper, and much more detailed analyses have been presented elsewhere (Clements, 1979), that Matriculation results could be interpreted in many ways, and that sometimes apparently-strong results were misleading.

When one considers the success of proprietors around 1900 in using the argument from Matriculation to lure interested parents into enrolling their children at "successful, high-quality" schools, it is hardly surprising that similar arguments continued to be used well into the twentieth century. Some schools came to be regarded as strong mathematical schools, and for that reason some parents chose to send their children to those schools. The relevant question for us all to ponder is this: Is there evidence that similar misleading, but nevertheless persuasive arguments and tactics are still in use in Australia today? If so, what is the impact on school mathematics—especially on how students think about mathematics, about how they study mathematics, and on how teachers plan and teach mathematics lessons?

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