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CURRICULUM AND ASSESSMENT: A QUESTION OF POLITICS?

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ABSTRACT

The Victorian Certificate of Education (VCE) has been subject to ongoing modifications since its full introduction in 1992. These changes were largely driven by vocal opponents of this educational reform. In this paper we give voice to teachers charged with implementing the curriculum and assessment directives of the VCE. Specifically, we draw on the experiences of close to 500 senior mathematics teachers – through interview and survey data - to consider the impact on them of the evolution of the VCE.

INTRODUCTION

In the early 1990s educational reform, globally, was fuelled by a desire to equip a new generation with skills deemed essential for meeting the requirements of a complex, rapidly changing and increasingly technologically dependent society (Hiebert *et al*, 1996). Governments often justified their interventions in the outcomes of schooling in terms of accountability for their growing economic outlay into education (Horwood, 1998).

In most Australian states, special certificate courses were developed to cater for the more diverse student population remaining at school till grade 12. For example,

In Western Australia, Certificate of Secondary Education (General) courses were added alongside the Tertiary Entrance Examination subjects. In South Australia, the Department of Education developed courses under a Secondary School Certificate to stand alongside the existing Public Examinations Board subjects. In Victoria, three initiatives developed alongside the Higher School Certificate.... (These included) a Tertiary Orientation Program (TOP) ... developed within the TAFE sector for students who wished to continue to study beyond Year 10 outside the secondary schools. In Queensland, the abolition of external examinations ... generated a substantial curriculum reform under the new structure. (McGaw, 1996, p. 29).

The Northern Territory, despite achieving self-government in 1979, has continued to rely on the South Australian secondary school system (Jacob & Frid, 1998).

Over time, the courses originally developed outside the mainstream Year 12 certificate were again amalgamated under a single certificate framework. Simultaneously, notions of appropriate assessment were broadened beyond strictly timed tests completed under rigid examination conditions. Extended, teacher assessed tasks, completed by students in and out of school, were introduced even in subjects where this had previously appeared inconceivable.

In an effort to reorient the teaching of mathematics towards the world of human practice, there was an increased emphasis in the 1980s on problem solving in mathematics (Teese, 2000). The aim was to provide a more flexible curriculum to enable students not suited to the old hierarchical model to explore "a limited number of areas seen as more relevant or meaningful" (p.170)

It is within this educational climate that The Victorian Certificate of Education (VCE) was launched in 1990. The issues raised in this paper within a Victorian context consequently have much overlap with those faced by teachers and students elsewhere in Australia.

BACKGROUND TO THE VCE

The VCE was introduced for English and mathematics in 1991 at grade 11 in all Victorian secondary schools, after ten pilot schools had trialed the new curricula in 1990. By 1992 the VCE was fully implemented into schools across Victoria.

From its inception, the VCE was envisaged as a two year course which spanned grades 11 and 12, served as a common credential for completing secondary school, and thus replaced

the collection of alternate certificates which had evolved over time to cater for students with diverse aspirations and abilities. Its assessment format symbolised and reinforced real structural changes in the delivery of post-compulsory education in Victoria. Briefly, the VCE was expected to encourage innovative teaching practices at all levels of secondary school through a broadening of the assessment tasks, and to provide an extensive curriculum to allow all students, not just those intending to go on to tertiary education, an opportunity to remain within the mainstream school and examination structure (Committee of Review on the VCE, 1997; Northfield, 1992). For example, 50 % of the assessment in the Year 12 mathematics subjects (or studies, as they were described in the VCE literature) was based on two innovative centrally set tasks to be completed over an extended period both in and out of class time and assessed by teachers using externally provided criteria and verified in a number of ways. The remaining 50% was based on two traditional tests done by students under strict examination conditions and marked centrally (see Leigh-Lancaster, 2000, for more details).

Opposition to this educational reform soon emerged, with considerable criticism of the assessment format coming from within the university sector (Teese, 2000). In one way the original VCE could be considered to have signalled an effort to disrupt the powerful influence of the university professoriate on the school curriculum. In science and mathematics in particular, students and teachers have traditionally been forced to accept an academic curriculum primarily designed as a preparation for university studies (Horwood, 1998). In other quarters, too, the VCE was perceived to be controversial (Northfield & Winter, 1993). Criticisms of the new examination procedures frequently captured the attention of the press. The widespread resistance to the new measures led to two waves of major modifications in the curriculum and assessment format during the mid-1990s. These changes resulted in a movement back towards the pre-VCE mathematics curriculum - a much reduced and more hierarchical subject selection with a greater emphasis on examinations.

By 1994, the VCE mathematics subjects available to students had been reduced from six to three. Assessment tasks were changed so that traditional, strictly timed tests contributed two-

thirds of the final mark in each of these subjects, with an extended task – an investigative project – contributing the remaining third. This last task continued to be teacher assessed, on the basis of assessment advice and externally provided marking schemes (Leigh-Lancaster, 2000).

The terms of reference of the most recent government Review of the VCE (1997) largely focused on maximising authenticity of students' school-based assessment tasks, and finding ways to reduce students' and teachers' workload. In most studies, including mathematics, school assessed Common Assessment Tasks [CATs] have now been replaced by school assessed coursework to be completed as part of the regular teaching program. The assessment "will consist of a collection of smaller, locally devised tasks from a specified selection of task types" (Leigh-Lancaster & Rowe, 1999, p. 321). The format of the examinations remains unchanged and is now used to moderate schools' assessment of coursework to ensure comparability across the State. Consequently, the recommendations of the VCE Review have devalued assessment tasks with a stronger focus on the development of mathematical communication skills and justification. Significant components of the curriculum in mathematics, the problem solving and investigative tasks, have been eroded to a small shadow of their original status over the decade.

Historically, the successful implementation of educational innovations has been thwarted "from within" when teachers do not have a clear understanding of what is expected of them, and when they have lacked the skills and knowledge required to perform their new role (Gross, 1971). It has been argued (Fullan & Stiegelbauer, 1991) that a crucial factor that affects the adoption and continuation of innovations is the quality of the relationship between policy-makers and local practitioners. It could be argued that for a decade the status quo has been an "innovative" curriculum in terms of formally valuing alternative assessment and teaching practices. 2000 has ushered in a further "reform" of the reformed curriculum that provides teachers with greater control over the school-based assessment. Hence it is critical to document teachers' beliefs and concerns with the curriculum as they were just prior to 2000, as this will be their point of engagement with the revised curriculum structure.

In the remainder of this paper we report the views of mathematics teachers, as they were in 1997, about the worth and impact of the VCE on classroom practices. The implications of these views for future teacher education and professional development are discussed. Teese (2000) highlighted different VCE assessment outcomes for students by school sector and region and in this paper regional and school sector differences are noted. It is our perception that teachers' voices have been largely absent from public discussion and from more recent policy directives that have been instigated. We hope that this paper will provide a useful historical marker for any future reform process of the secondary school curriculum (see also Brew, Leder & Rowley, 1999; Brew, Rowley & Leder, 1998).

THE STUDY

Our findings rely primarily on a survey mailed to secondary schools across all regions in Victoria and within the three school sectors: State, Catholic, and non-Catholic Independent. The content of the survey was informed by the stated aims of the VCE and by the findings of a pilot study, which is described next.

The Pilot Study

In October-December 1996, interviews with 40 mathematics coordinators, representatively selected from all school sectors and regions in Victoria, were conducted to explore the impact of the evolution of the VCE on schools, teachers, and teaching practices. Though structured only loosely, each interview explored the following issues: demographic information about the school, biographical information about the interviewee, staffing matters, the organisation of mathematics courses at the school, allocation of classes, numbers of students studying the different mathematics subjects at the upper school level, selection procedures, special arrangements, effects of the VCE on self, colleagues, and students, curriculum and assessment issues, professional development and resource issues, effect of the Common Assessment Tasks (CATs), and any other matters of concern to the interviewee. In most cases, interviews exceeded the one hour originally requested. The findings of the pilot study were reported to teachers at the annual conference of the Mathematical Association of Victoria (Brew,

Rowley, & Leder, 1996). Here it was suggested that despite having sampled a broad range of schools, the views expressed were unlikely to be representative of VCE mathematics teachers in general since we had interviewed mainly mathematics coordinators. This feedback was incorporated into the second stage of the research and, together with the experiences of teachers expressed in the interviews, shaped the content of the survey mailed to schools.

The Survey

In April 1997, surveys were mailed to 250 randomly-chosen secondary schools within the three school sectors. Tapping each of the sectors, 150 State schools were approached, 50 Catholic and 50 Non-Catholic Independent schools. Close to 500 VCE mathematics teachers responded from 162 schools (83 State, 44 Catholic and 35 non-Catholic Independent). The school response rate was 65%.

Format of the Survey

The survey contained 140 items. Teachers were asked to identify their school's sector and regional locations, and whether their school had obtained funding under the disbanded Disadvantaged Schools Program [DSP] (pre 1993) or the Victorian Equity Program (1994). Biographical data were also sought to allow comparisons between teachers' views and experiences by gender, years of teaching, and qualifications. A standard Likert five-point scale was adopted for most items with teachers being asked to indicate their strength of feeling from "strongly agree" to "strongly disagree". A "yes/no" response was requested in some cases; further comments in others.

The main areas probed are illustrated below with a sample question from each of the main sections.

Workload: My current VCE workload is too high for me to teach as effectively as I am capable of doing.

Assessment verification: I have confidence that if any students' work is recalled it is marked fairly by the Victorian Board of Studies (VBOS) in their review process.

Assessment authentication: *I am confident of my ability to assess CAT 1 in accordance with the VBOS marking criteria.*

Assessment structure: *I have concerns with the structure of CAT 1/2/3. (If so what are they?)*

Professional practice: *Since the introduction of the VCE in 1992, I now teach mathematics differently in my senior/junior mathematics classrooms. Please explain.*

Professional development: *At my school there is a lot of support for teachers from each other to attend inservices.*

RESULTS

It is convenient to report major findings of the survey under headings which reflect the broad themes covered.

The Impact of the VCE upon Junior Level Mathematics

One aim of the VCE was to encourage innovative teaching practice across all levels of secondary schooling through a diversified assessment program at the highest level. Seventy-five percent of teachers said that they had modified their mathematics teaching at both senior and junior levels since the inception of the VCE. Support for the major innovations with their greater emphasis on problem solving and project based studies was high (83%) across all school sectors and regions. The highest support came from teachers in the Catholic sector (90%) and those in rural or outer metropolitan regions (87%). These innovations were reported by 68% of teachers to have led to an enhanced focus on mathematical communication and justification of work. Again, this perception was most marked among teachers at Catholic schools (75%). A minority of teachers (24%) believed that problem solving and project work "keeps students busy but they do not gain any more mathematical knowledge". This view was most prevalent among experienced, male teachers and teachers at inner metropolitan and non-Catholic Independent schools. In contrast, just on half of the teachers wished they could include more project work and problem solving in their junior

classes but the time required for marking prevented them from doing so. From the interviews with the coordinators it also emerged that it was more difficult to be innovative at the higher grade levels due to the severe time limits and high stakes nature of the assessment. Despite the restrictions, junior level teaching provided the greatest opportunity to be inventive and flexible in their teaching practice. The following quotes taken from interviews provide examples of this perspective:

There is a lot less chalk and talk than there was, especially in the junior levels. A lot more activity based learning. (At) VCE level, there is still a lot of chalk and talk as you have to get through the course.

Problem solving ... was the best innovation, which filtered its way down the school so we now have specific problem solving exercises from Year 7 up. (The VCE) certainly has changed teachers' attitudes to the importance of problem solving and projects. At the top end it hasn't worked as well where you have a four-week project. That is too demanding.

Female teachers were somewhat more likely to say they had modified their junior mathematics teaching practice than were male teachers (females: 77%; males 71%). This is consistent with the notion that the VCE had to some extent feminised the curriculum through the introduction of assessment that required greater language skills. Such skills were more likely to be possessed by girls than by boys and hence provided a greater opportunity for girls generally to participate in mathematics.

The attempt to introduce and broaden innovative practice in the junior level teaching was not without its problems. The rationalisation process that was sweeping through State schools in the mid 1990s, epitomised by reduced budgets and staffing, would appear to be a major factor, not just a backlash against top down change (Fullan & Stiegelbauer, 1991).

The VCE has changed mathematics right through down probably as far as year 8. There was certainly an enormous change two years ago. I think a lot of that has gone by the board now

because people have cut back a lot of the project work because of the time features. I know I was doing a lot more project work three years ago compared to now.

One big problem is the VCE is enormously time consuming to do it correctly, (because of) the workload, a lot of people are paying lip service. ... realistically, if you do a Year 10 class and do the projects correctly, you have created 10 hours of work. To put in 10 hours at one class and then you have to do similar things at Year 7, 8 and 9, you are looking at a phenomenal work load, you can't run a high quality program and cut the guts out of it which is what is happening.

While it is not possible to surmise how teachers actually delivered and orchestrated the curriculum in the classroom, their responses, including at times their frustration, do indicate a high level of commitment to the spirit in which the VCE was first created. It is this spirit that needs to be supported in teacher education programs.

High Workloads

A huge increase in teacher workload was a major factor associated with the introduction of the VCE. This concern emerged from both the interviews and survey findings. Nearly one in every two teachers reported that high workloads were interfering with effective teaching (Figure 1). This was most evident among teachers at inner metropolitan (59%) and non-Catholic Independent schools (58%), in which there has been a stronger tradition for teachers to maximise their students' academic achievements.

Q.35 The VCE has increased my workload
 Independent 92%
 Catholic 89%
 State 94%

Q.36 My current workload is too high for me to teach effectively
 Independent 58%
 Catholic 44%
 State 46%

Q.37 The VCE has increased my students' workload
 Independent 91%
 Catholic 87%
 State 78%

Q.38 Student workload interferes with effective learning
 Independent 72%
 Catholic 55%
 State 54%

Figure 1

Thus teachers perceived the introduction of problem solving and project work to be very time consuming, both in the classroom and in the assessment of generated student work. It appeared that it was increasingly more difficult for State schoolteachers to maintain the momentum and commitment to an innovative curriculum right across all levels during a rationalisation process and casualisation of the workforce.

We have eighteen staff here involved in maths, and I would estimate that there are five who are full time maths. Considering we have 930 students, I would have hoped for more. There are six teachers that have got one class and that doesn't represent the building of strength.

One of the major problems is that the government has now brought in this rule about absorbing your own excess. We were in a position of having seven teachers in excess ... and this has caused us to be pulling in a number of people from other faculties ... with little maths experience to take junior classes. I have always had a rule at the school you put your most experienced people with the year 7s and the VCE. ... But when you are in a situation where you have someone who is the careers teacher and who has taught junior maths ten years ago, you are forced into putting that person in year 7 or 8, not in the middle school.

Roberts (1994) reported similar problems. Despite teachers in Years 7-10 attempting to introduce more VCE-like exercises into their courses, they were frequently not well qualified in mathematics and therefore evaluation and

analysis, the two key areas that allow students to obtain higher grades, were not generally a focus. This situation is only likely to worsen without proactive attention to halt the diminishing number of mathematics graduates (Leder, Forgasz, & Brew, 1998) and hence the dwindling pool of mathematics graduates seeking careers in teaching.

Teachers' Qualifications

The majority of mathematics coordinators (86%) did, however, indicate there were enough qualified mathematics teachers at the school to teach the necessary VCE subjects. At the same time it must be noted that 14% would seem to be an unacceptably high level of schools to not have adequate staffing. A breakdown down by years of teaching senior mathematics indicated that nearly 80% of teachers with more than 20 years experience had studied three years of university mathematics while fewer than 60% of the teachers with less than five years experience had done so. Although the data revealed that a few schools have always been using unqualified mathematics teachers to fill shortfalls, there were indications that the shortfall is growing.

Restrictions on Innovative Teaching Practice

While the VCE was aimed at encouraging innovative practice, schools that had developed their own initiatives for catering for students individually felt thwarted in their efforts.

(We have not changed the way we teach) at VCE, we have changed the way that we teach from 7 to 10, but VCE is getting in the way. ... We adopted a system where everybody does their own thing at their own speed all continuously assessed ... each one of them is a case management system. (So) we would like to teach individually and VCE as well, but because of the administration ... it might prove difficult. For example, suppose I have a student in Year 8 who is ready for VCE and is quite capable of teaching themselves the whole lot and they still have to hand in their projects and they can teach themselves all the theory very quickly. I don't see why it should take them 12 months. I don't know what is

wrong with 3 months. ... So I think that ties you down to teaching in old-fashioned ways.

There was further evidence that the VCE was experienced as restrictive by teachers rather than providing a means of being more creative with the course structure. This was particularly evident after the second round of modifications in 1994 when three hierarchical mathematical studies replaced the existing six study choices that incorporated broad choice through a cluster system. While there was widespread support for the three-study structure (83%), there was not a similar level of support for the associated reduction in study choice (61%). The content and flexibility of both Mathematical Methods and Specialist Mathematics were perceived as appropriate for their intended clientele (84% and 89% respectively), but Further Mathematics, the mathematics perceived as the most appropriate for the less academic learner, was the least likely to be considered as meeting the needs of the students (63%). This outcome is consistent with only half of teachers (51%) expressing the view that the VCE curriculum was allowing them to cater well for the lower ability mathematics students compared to 90% who thought they were catering well for the middle and higher achievers. This situation was even more evident for teachers at former DSP/VEP schools (Figure 2).

The VCE structure allows our school to cater well for the lower ability mathematics students.

<i>Agree</i>	
<i>Former DSP/VEP schools</i>	32%
<i>Other schools</i>	57%
<i>Disagree</i>	
<i>Former DSP/VEP schools</i>	56%
<i>Other schools</i>	30%

Figure 2

Gender and Assessment

The views of teachers on possible bias in the assessment format by gender were consistent with the performance evidence (Leder, Brew, & Rowley, 1999). More teachers agreed that the school-based assessment provided a better opportunity for girls to succeed compared to boys (38% vs 27%) and more teachers agreed that the examinations provided a better

opportunity for boys to succeed compared to girls (44% vs 12%). That many teachers were undecided may well reflect the now clouded situation because of the greater tendency for girls compared to boys to self-select out of higher level mathematics (Rowley, Brew, & Leder, 1997) or out of mathematics altogether (Lamb, 1997). It may also represent a level of ambivalence among teachers about gender issues. This ambivalence was captured in interview excerpts about the lower participation rates of girls in the higher-level mathematics subject:

Interviewer (I): In specialist maths do you know what the proportion of girls is to boys?

Respondent (R): About 2 or 3 girls and the rest boys.

I: Is that something that the school gets concerned about, looks at issues?

R: We try and encourage the kids to do whatever they want really, the girls tend to do more biology and stuff like that.

I: Is it considered an issue at the school that there are fewer girls doing Specialist?

R: Well not a big issue, like we encourage kids.

I: Is there any reason why fewer girls do Specialist?

R: I don't know I haven't actually asked.

The Relationship between the Policy Makers and Teachers

The VCE Review has maintained the status of the General Achievement Test (GAT) in assisting the Victorian Board of Studies (VBOS) to moderate and authenticate school assessment. Our data revealed that, although the large majority of teachers were confident in following the marking criteria set by VBOS (83%), they had far less confidence in the moderation process, with only 36% believing that their students' work, if recalled, would be marked fairly by VBOS in their review process. Even greater concern was expressed about the use of

the GAT to support the review of school results with only 16% agreeing this was appropriate.

Professional Development

The overwhelming majority of teachers reported that they felt competent to teach the VCE (98%), though teachers from non-Catholic Independent schools (mean = 4.70) were more likely to strongly agree with this statement than teachers at State schools (mean = 4.54; $F = 4.47$; $df = 2$; $p = 0.02$). This was consistent with the far greater support for professional development provided for teachers in both Independent sectors compared to those within the State school system (non-Catholic Independent mean = 4.01; Catholic mean = 3.93; State mean = 3.61; $F = 8.79$; $df = 2$; $p < 0.001$).

CONCLUSIONS

Providing for the diversity of student aspirations, the requirements of tertiary institutions, the economic needs of the State, and a fair and equitable education system for all, is clearly a daunting balancing act. Our survey revealed a high level of support among mathematics teachers for alternate assessment options at the VCE level. There appeared to be a widespread perception, withstanding considerable differences of opinion, that such assessment practices encourage different mathematical skills in students, and in particular, offer opportunities for students to apply their mathematical knowledge rather than just follow rules and procedures. The alternate assessment requirements were also seen as encouraging more innovative teaching practices in the junior levels.

The VCE in its original format clearly stood as a genuine attempt to meet many needs. The subsequent modifications imposed in response to powerful political forces have made an accurate assessment of its impact on the curriculum, teachers, and students more difficult. The high stakes nature of assessment at the end of secondary school has clearly inhibited the acceptance of non-examination based assessment in the wider community. With hindsight it appears that some of the pre-VCE mathematics courses may well have catered better for the diversity of student needs and aspirations, particularly for students who did not wish to pursue a purely academic stream. The

introduction of a new study at year 11, Foundation Mathematics, in 2000, appears to be a direct response to teachers' concerns that not all students were being catered for by the VCE. This study has been developed, in part, from curriculum materials used in the pre-VCE Tertiary Orientation Program and current courses in the adult education sector.

In terms of gender, the 1992 VCE mathematics assessment data demonstrate uniquely that boys do better overall than girls in traditional examinations while girls tend to perform better than boys on the more intensive school-based assessment (Leder, Rowley & Brew, 1999). In recent years, this gender related performance pattern across the CATs has been obscured by the ongoing modifications. With statistical modelling to control for the tendency for girls to select themselves out of higher level mathematics, the clear gender pattern evident in the 1992 data remerged for 1994-1996 (Rowley, Brew & Leder, 1997). It is conceivable that the use of examinations to moderate the school-based coursework may well exacerbate the advantage to males in the overall assessment.

What remains crucial for the ongoing educational outcomes of students is the quality of the relationship between the policy-makers and the local practitioners. The survey data revealed a low level of trust between VBOS and teachers. Although the new assessment structure should reduce the conflict that teachers may feel in their dual role as educators and assessors, the value placed on mathematical communication and reasoning, reinforced by the original VCE assessment tasks, is also reduced. Tensions between competing needs remain. It has proved more difficult than anticipated using a high stake, state-wide and centrally set examination such as the VCE, to validate alternate assessment tasks which incorporate important skills needed by students in and beyond educational institutions in a complex, rapidly changing society. At the time the original VCE was introduced teachers expressed considerable uncertainty about the alternate assessment. After 10 years of experience, and with the resources now available, their appreciation of non-examination type assessment seems to have shifted. It remains to be seen whether teachers will be able to maintain the most valuable aspects of the original VCE, now they have greater local control over the school-based assessment format.

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