Chapter 1
The Australian Curriculum: Mathematics – World Class or Déjà Vu

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This chapter raises two questions about the Australian Curriculum: Mathematics: What practices it may inspire and what might be its contributions to the national goals of education. The first questions is about the *internal cohesiveness*, or the synergy between the curriculum's stated aims and rationale, on the one hand, and the content and its articulation on the other, and what vision of mathematics education they may inspire across the different jurisdictions which would adopt it. The second question is about its *external cohesiveness*, or the synergy between the curriculum itself and the national expectations of education and what contribution it may make to the public good in the Australian society. The chapter questions whether only lip service in the elaborations is given to the General Capabilities, Cross-curricular Priorities, and the high order Proficiencies. Similarly, the lack of focus on conceptualisation and articulation of the purposes of learning mathematics opens up the possibilities of designing school-based curricula that are far from achieving the national goals of active and informed citizens.

This chapter engages with the "Introduction" to the Australian Curriculum: Mathematics (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2011). In this context, we use the term "Introduction" to refer to the two sections of the document called "Rationale and Aims" and "Organisation" that precede the main section called "Curriculum F-10". In this analysis we raise two fundamental questions: 1) what potential practices it may give rise to in schools and 2) does it potentially contribute to the achievement of the national educational goals in Australia? While we deal with these two questions separately, they are not necessarily disjoint. The first question is about the *internal cohesiveness*, or the synergy between its stated aims and rationale, on the one hand, and the content and its articulation on the other, and what vision of mathematics education they may inspire across the different jurisdictions which would adopt it. The second question

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is about its *external cohesiveness,* or the synergy between the curriculum itself and the national expectations of education and what contribution it may make to the public good in the Australian society.

We acknowledge that the formal curriculum is not the sole determinant of the practices of teaching and learning nor is it the sole means of achieving national goals. Talking about science education, vanden Aker (1998) differentiates between the *ideal*, *formal*, *perceived*, *operational*, *experiential*, and *attained* curriculum. In dealing with the first question, we focus on the possible relationship between the *formal* curriculum and the way it may be *perceived* by teachers. By the same token, the second question focuses on the relationship between the *ideal* curriculum and the *formal* curriculum.

In the following two sections we will expand on the rationale for each question and the tools that we will adopt for discussion.

Question 1: What practices it may inspire?

The Australian Curriculum: Mathematics asserts that it does "not prescribe approaches to teaching" (ACARA, 2011, p. 7) (nor it should, we may add). However, a formal curriculum, perhaps in contrast to a mere syllabus, is developed with the expectation that it will influence the practices of teaching, learning and assessment in a particular discipline and in a particular jurisdiction. In other words, while a formal curriculum should not dictate a single approach to teaching, a possible lack of cohesion between the aims and rationale and the content and its articulation will inevitably lead to difficulties for schools and teachers in planning and implementing the actual student experiences in the subject. In particular, pedagogical and assessment decisions in schools are informed by what they consider valuable in the subject as much as by what content is suggested (mandated by a regime of testing?) in the curriculum.

Statements such as those covered in the Introduction determine the general directions and parameters in which the practice of mathematics education might take place as a result of the implementation of the curriculum. In discussing this Introduction we adopt the view that a formal curriculum is not *only* to be taken in a *technical* sense as a list of content "to be taught and learnt" (a function usually referred to as syllabus), and not only in a *practical* sense, "how content is explored or developed" (p. 2). The formal curriculum should also be taken in a *pragmatic* sense to present a vision and rationale that informs the selection, sequencing of the content, and assist its users in the development of a pedagogy and student assessment practices that are consistent with intended purposes of the curriculum (Bernstein, 1990). Thus cohesiveness in the curriculum is important at a *symbolic level*. If the Introduction section of a curriculum is to be changed from one set of articulations to an alternative and if this change has no bearing on the content descriptions, this raises serious question on the internal consistency of the curriculum. More importantly, it may be an indication that mere lip service is being paid to the stated aims and rationale or that they are not seen as valuable enough to inform content selection and elaboration.

Prior to discussing in detail the cohesiveness of the Australian Curriculum: Mathematics, it is helpful to briefly outline the structure of the document as a whole and the role of the Introduction. The Introduction of the Australian Curriculum: Mathematics serves many functions. It presents a rationale for and aims of the curriculum, and identifies the main foci of the curriculum including Content Strands, Proficiencies, General Capabilities and Cross-Curriculum Priorities. The two sections relating to the Achievement Standards and Implications for Teaching, Assessment and Reporting are also relevant to our discussion here. Although a section entitled Diversity of Learners is also included in the Introduction, we do not discuss this in this chapter, as it will be discussed in depth in the chapter by Jorgensen in this collection. While not the main focus of this chapter, the Introduction is followed by a 34 page list of the content appropriate at each year level of schooling with some elaborations on each and Achievement Standards for students at each year level. Finally, the Curriculum contains 40 pages of a Glossary defining standard mathematical terms.

The Content in the Curriculum is understood as describing "what is to be taught and learnt" (ACARA, 2011, p. 2). It is articulated into three strands called *Number and Algebra*, *Measurement and Geometry*, and *Statistics and Probability*. The description of the content lists the concepts, skills and procedures and applications relevant to each content strand. The Introduction also describes four Proficiency strands adapted from the United States' report to the National Research Council, Adding it up: Helping Children Learn Mathematics (Kilpatrick, Swafford, & Findell, 2001). Of the five strands identified in the USA model, four were used in the Australian Curriculum: Mathematics and renamed as *Understanding*, *Fluency*, *Problem Solving* and *Reasoning*. The Introduction further identifies seven General Capabilities first identified in the Melbourne Declaration as characteristic of a world class curriculum and "that underpin flexible and analytical thinking, a capacity to work with others and an ability to move across subject disciplines to develop new expertise" (Ministerial Council on Education, Employment, Training and Youth Affairs [MCEETYA], 2008, p. 13). The Australian Curriculum: Mathematics identifies these as:

- literacy
- numeracy
- competence in information and communication technology (ICT)

- critical and creative thinking
- ethical behaviour
- personal and social competence
- intercultural understanding. (ACARA, p. 8)

The Introduction then identifies three Cross-Curriculum Priorities adopted in the development of the whole Australian Curriculum; a local priority: Aboriginal and Torres Strait Islander histories and cultures; a regional priority: Asia and Australia's engagement with Asia; and a global priority: Sustainability. It is intended that "[t]he cross curriculum priorities are embedded in the curriculum and will have a strong but varying presence depending on their relevance to each of the learning areas." (ACARA, 2001, p. 10). Some of the implications of these priorities to the mathematics curriculum are discussed in the content elaborations.

Question 2: What contribution to the national goals it may have?

If the internal cohesiveness of the curriculum is important for symbolic and practical reasons, the *external cohesiveness* is equally crucial for *policy*/*political* reasons. Both the "what is taught and learnt" and "how is it explored and developed" can be subjected to querying as to whether they provide strong justification with respect to the social goals and education for the public good. This engagement with national goals is necessarily an engagement with the purposes of education itself. Furthermore we contend that the formal curriculum has an equally important and wider role within the entire fabric of Australian society. As Apple (1979) reminds us, the curriculum is a political activity through and through. It legitimates what knowledge and skills are valued in society and whose voices are represented. Undoubtedly, the curriculum a society produces is a representation of its traditions and history, a reflection of its cultural identification, but equally it should provide a vision of the future and a vehicle for transformation (Kennedy, 2009). In other words, curriculum development has the two faces of Janus, one face looking to the past and one looking to the future. Arguably, the development of the Australian Curriculum: Mathematics reflects an awareness of the role of education for the achievement of national goals and that these goals are in constant state of flux. For example, the first point in the rationale for the *Shape of the Curriculum Version 2.0* (ACARA, 2010) noted, "Education plays a critical role in shaping the lives of the nation's future citizens. To play this role effectively, the intellectual, personal, social and educational needs of young Australians must be addressed at a time when ideas about the goals of education are changing and will continue to evolve." Further, the Australian Curriculum: Mathematics has been developed within a bigger process that is informed by setting national goals for Australian school education in what is widely known as the Melbourne Declaration (MCEETYA, 2008) which will be discussed below.

Arguably, questions as to purposes of education are not often taken as crucial in academic and policy discourse in education (Beista, 2010). Educational debates and practices seem to be more concerned with issues related to achievement of learning outcomes and their measurement rather than with a debate on the value of the learning. In other words, as Beista comments, philosophical questions about the curriculum are often constructed as technical and managerial ones. (Similar observation can be made about research in mathematics education, which often seems to be more concerned with how we can introduce a concept to maximise learning rather than with why and to what purpose such learning is useful). Beista provides a critique of the language of *learning* as the dominant discourse in education and suggests that this is perhaps a main reason for the disappearance of the discourse on *purposes* of education. Undoubtedly, student education is the core business of schools. However a discourse of *learning*, in contrast to one of *education*, does not allow for the examination of key questions relating to the purpose and value of education. Beista calls this shift from the discourse of education to that of learning the *learnification* of education. In such a discourse students are constructed as clients and teachers and schools as providers, while education itself is constructed as being for the individual benefit rather than for the public good.

An engagement with the purposes of any school subject is necessarily an involvement with questions of values. On the one hand many participants in the curriculum debate see the power of mathematics as lying in its "objectivity" and "universality" and in being "value free" (Bishop, 1998). On the other hand there are those who argue that mathematics is culturally constructed, and both reflects and shapes the values of society (Ernest, 1991). These disparate positions on the purposes of mathematics education are shaped by personal interests and perspectives, social and political philosophies (conservative, progressive or liberal) and the interests of disparate special groups (business, mathematicians or teachers). They may also raise questions as to the balance between personal vs. public interests. However, rather than attempting to reach some sort of fragile consensus, we suggest that a continual and robust debate about the purposes of mathematics education is essential if education is to contribute to the public good and contribute to national future plans and visions.

Beista (2010) argues that the purposes of education are not uni-dimensional. Rather he identifies three different types of purposes. First, education serves the purpose of *qualification* by providing students with knowledge, concepts, skills and dispositions to be able to engage in an action or way of life. These purposes relate primarily to work, daily living and the knowledge required for future learning.

Biesta claims that education serves a second purpose which he calls *socialisation* – assisting students to participate and become part of a social, cultural or political order. This purpose enables students to learn skills that enable them to participate as active citizens in a certain community. However it also includes the development of values and norms accepted within that community(ies). Biesta asserts that at times such purposes are achieved even though they may not be explicitly articulated (as in the hidden curriculum, for example). Lastly, Biesta identifies another set of purposes to which education contributes, once again whether by design or not, which he calls *subjectification*. In one sense, these purposes are the opposite (though not incompatible) to the previous purposes. While the above purposes aim at social inclusion as a participant of a social group, these purposes aim at developing a level of independence and a sense of identify and uniqueness—in other words a human subject. They allow challenges to the social order when necessary and the construction of alternative possibilities. They allow for innovation and problem raising as well as the solving of social problems. However, one should note that these purposes do not lead back to the individualisation of education characteristic of neo-liberal approaches (to which Biesta is strictly opposed). In this construction of the purposes to education the individual does not stand alone in the social order but as a unique participant who is "subjected to the subjectivity of the other". Hence Biesta prefers the use of the term *subjectification* rather than *individualisation*.

Engaging the Australian Curriculum: Mathematics

Engaging Internal Cohesiveness

While the identification of Content, Proficiency, General Capabilities and Cross-Curriculum Priorities in the Australian Curriculum: Mathematics is to be commended, it results in a complex curriculum. The implementation of the Australian Curriculum in the design of school curricula, including selection and sequencing of activities, actual pedagogies and assessment practices employed, is not unproblematic. In developing school-based curricula, schools and teachers need to make decisions on these varying stipulations based on their judgment of their relevant importance to the general education of the students and their understanding of their roles. Traditionally, teaching in most schools has given priority to content topics as the main curriculum organisers. However, other programs, such as the New Basics Project in Queensland, have presented curricula designed around the equivalent of the General Capabilities.

In the organisation of the Australian Curriculum: Mathematics, the Content is given priority as the main organiser of the curriculum topics, with the other stipulations included in the elaborations of the Content strands. Decisions on curriculum organisation are, of course, also subject to the value given to each aspect in the regime of testing, whether this assessment is developed by the schools themselves or imposed on them externally. Consistent with privileging the Content as curriculum, the Achievement Standards sections describe skills and concepts articulated in the content descriptions, with little or no reference to other capabilities. Without excluding the possibility of other practices, the discussion of assessment in the Curriculum seems to target the Content strand in its wider interpretation of concepts, processes and skills. No direct mention in this discussion is made to Proficiencies, General Capabilities or Cross-Curriculum Priorities.

If these capabilities are, indeed, an integral part of students' mathematics education, how helpful is the Curriculum in promoting their implementation in the mathematics classroom? First we note that there is an apparent confusion in the articulation of Proficiencies in the Introduction and the ways in which they are exemplified in the Content elaborations.

On one hand, these proficiencies are understood as "*actions* in which students can engage when learning and using the content" (ACARA, 2011; p. 2. Italics added for emphasis). In other words they describe "how the content is explored or developed" (p. 14). Hence, in this understanding, they are not presented as outcomes or aims to be developed and assessed. This view of proficiencies as means of experiences or actions, is consistent with their absence from the statement in the Introduction about Achievement Standards that "achievement standards indicate the quality of learning" which is described as "the extent of knowledge, the depth of understanding and sophistication of skills" (p. 6).

On the other hand, the actual descriptions of the four proficiency strands give an alternative construction of their nature. For example, Understanding is elaborated as: "Students build a robust knowledge of adaptable and transferable mathematical concepts"; Fluency as: "Students develop skills in choosing appropriate procedures, carrying out procedures flexibly, accurately"; Problem Solving as: "Students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising"; and Reasoning as: "Students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising"(p. 3). These articulations imply that the proficiencies describe dimensions of student performance within mathematics rather than a type of experiences they have in its study.

It is worthwhile to note that this last understanding is consistent with the interpretation in the original U.S. model. Kilpatrick et al (2001) explain "recognizing that no term captures completely all aspects of expertise, competence, knowledge,

and facility in mathematics, we have chosen mathematical *proficiency* to capture what we think it means for anyone to learn mathematics successfully" (p. 5). Here the proficiencies are taken as components of mathematics performance that can, as the curriculum writers assert, be developed through mathematics teaching. Indeed, this interpretation of Proficiency is reflected in the second Aim adopted by the Australian Curriculum: Mathematics itself that students "develop an increasingly sophisticated understanding of mathematical concepts and fluency with processes, and are able to pose and solve problems and reason in Number and Algebra, Measurement and Geometry, and Statistics and Probability" (ACARA, 2011, p. 1).

Moreover, it is important to also be conscious of the origin of this particular list of proficiencies. The authors of the US report acknowledge:

> Our analysis of the mathematics to be learnt, our reading of the research in cognitive psychology and mathematics education, our experience as learners and teachers of mathematics, and our judgments as to mathematical knowledge, understanding, skills people need today have led us to adopt a composite, comprehensive view of successful mathematics learning. (Kilpatrick, et al., 2001, pp. 115-116)

Arguably, every single framework for talking about mathematics education arises from within a particular philosophy of education and a particular epistemology. It also reflects a certain view of what is ultimately valuable in students' engagement in their school experiences. In terms of the discussion by Biesta (2010) referred to above, this model of proficiency arises within the *learnification* paradigm. It attempts to summarise the dimension of student performance that posits mathematical knowledge as an aim by itself rather than a tool to achieve other purposes. An alternative literature base, for example one that takes a more social and critical dimension such as critical mathematics, mathematics for social justice or ethnomathematics, would produce different desired and valued proficiencies and/or different understandings of these identified proficiencies.

But how are these proficiencies reflected in the Content elaborations in the curriculum itself? To illustrate a general concern about the implementation of these proficiencies, we have examined the elaborations at one arbitrary school level, year 8, and analysed which proficiencies are in focus at that level. One has to first recognise that the above four proficiencies are not disjoint, either under an understanding of them as dimensions of performance or as experiences provided by the teachers. Hence some content elaborations may relate to one or more of the proficiencies and there may be some disagreement on the interpretation of some elaborations. However, an interesting pattern arose from our analysis. Twenty three of the 43 elaborations, (53%) relate to experiences to develop understanding (e.g. "understanding that the real number system includes irrational numbers and that certain subsets of the real number system have particular properties" (p. 38)).

Twenty four of the 43 of the elaborations (56%) relate to developing fluency (e.g. "evaluating numbers expressed as powers of positive integers" (p.3 8)). Five of the 43 elaborations (12%) relate to problem solving (e.g. using percentages to solve problems, including those involving mark-ups, discounts, profit and loss and GST (p. 38)). A mere three of the 43 elaboration (7%) refer to reasoning (e.g. "investigating an international issue where media reporting and the use of data reflects different cultural or social emphases (for example whaling, football World Cup outcomes)" (p. 40)).

Perhaps the message that these might give to a teacher as to what type of experiences they should focus upon is rather obvious. However, let us examine these elaborations further. Of the five elaborations that are obviously related to problem solving, two are from within the context of mathematics itself (e.g. congruency theorems); one from financial interactions (e.g. profit and discounts) and three are open ended related to "probability questions about objects or people" and "collecting data to answer the questions about Venn diagrams" (p. 40). Of course authentic problem solving may still be used by teachers in order to bring mathematics alive and to assure enriching meaningful experiences; however it is valid to raise the concern that the curriculum document itself may not inspire teachers to appreciate the importance of these proficiencies and to think of valuable and exciting ways in which they can be used or developed in the classroom.

Similar concerns can be raised about the minimal reference in the Content descriptions and elaborations to the other stipulations in the curriculum such as the General Capabilities and the Cross-Curriculum Priorities. On our reading of the document, their incorporation in the elaborations is either non-existent or, at best, trivial. It is relevant to note that while the Proficiencies are mentioned in the Aims the Curriculum but not in the sections on assessment, the General Capabilities and Cross-Curriculum Priorities are not mentioned in either. This gives the impression that either lip service is paid to them (despite the assertion that they are important), or that they are seen as natural by-products of the curriculum and hence they do not need to be elaborated and illustrated, or that teachers may rely on sources other than the Curriculum itself to plan for their achievement. We suggest that these latter interpretations are somewhat spurious.

Hence, we are not convinced that the published Curriculum is internally consistent in its assertions of what is important in the Introduction when this is read in conjunction with the articulation of the content and its elaboration in the main body of the document. The heavy dominance in the curriculum of Content as an organiser of knowledge and as the major focus of the elaborations, and the limited explicit articulation of the effect of the other stipulations, lead to two (perhaps

related) concerns for its potential to contribute to the practice of mathematics education in Australian schools.

The first concern was raised by Luke (2010) in his article in a special issue on the Australian Curriculum in Curriculum Perspectives. Luke points to findings of a wide-ranging longitudinal study conducted in Queensland on school teaching. The study showed that most classrooms studied revealed a strong focus on what can be called core skills and content in the different subjects observed. However, the study identified as major requirements for higher student outcomes a sustained focus on high order thinking skills and a visible connection between the school subjects and the life knowledge and social life of the students. Of course, the Australian Curriculum: Mathematics does not close the door on teachers addressing these challenges in their teaching. But nor does it provide much direct help to assist teachers to realise these challenges, or useful exemplars on how they can construct "powerful and engaging experiences" (p. 1) for their students.

The second concern, or a worst case scenario, is that the Australian Curriculum may be utilised to justify a "back to basics" movement in mathematics education. For some political leaders in the highest offices of the land that is exactly what the national curriculum intends. On February 28, 2010 The Age newspaper reported on the launch of the Australian Curriculum where the then Prime Minister, Mr Rudd said the objective was,

> without apology, to get back to the absolute basics on spelling, on sounding out letters, on counting, on adding up, on taking away. The basics that I was taught when I was at primary school a long time ago, and that's what our national curriculum is all about. (Bachelard & Stark, 2010 para. 8-9)

This expectation that the national curriculum would represent a "back to basics" focus is also represented in some editorials and many letters to the editor of many newspapers around Australia. Yet, this was not the way the curriculum developers themselves saw their endeavour or aim. In the same article, The Age quotes Barry McGaw, the ACARA Chair of the National Curriculum Board as saying,

> I don't like back to basics, because it implies you're only focusing on initial performance … we need a curriculum that builds the basics, but also extends students, hence the emphasis on literature. (Bachelard & Stark, 2010, para. 11)

Of course, one can attribute the above assertion about the "back-to-basics" to mere political rhetoric. However, discourse is never innocent. As Foucault (1976) reminds us, it creates the reality it talks about. We share the concern expressed by Luke (2010) that a major danger of a curriculum focusing on content and skills is the possibility that "it sets the conditions" (p. 8) for such an eventuality. Undoubtedly, a back-to-basic movement would be contrary to viewing of educational goals as ever developing in response to changing social contexts as expressed in both the

Melbourne Declaration and the Shape Statement mentioned above. Here we argue that, if the ultimate justification of the curriculum is to form the basis for regimes of testing across the different school systems, the elaborated content is totally justified. However, for the curriculum to lay the foundation of reform in the teaching and learning of mathematics, such lack of elaborations of the higher order Proficiencies, General Capabilities and Cross-Curriculum Priorities are regrettable, to say the least.

Engaging the External Cohesiveness

The previous section discussed what we have called the *internal cohesiveness* of the Australian Curriculum: Mathematics. The main focus there was the consistency between what the Curriculum professes to be important and the way it describes the content to be taught and experienced. The main concern was with what type of classroom practices that the Curriculum might enable, encourage and embody. The discussion in this section is about its *external cohesiveness*. The focus here is the consistency between the curriculum produced and the national goals of education as articulated by the Melbourne Declaration in particular, and the discussion of purposes of education articulated by Biesta (2010). The main concern is the potential contribution of the Curriculum to education for the public good of Australians.

The Melbourne Declaration (MCEETYA, 2008) represents an agreement by all State, Territory and Federal Ministers of Education on the educational goals of Australian young people. It identifies two major goals for schooling in Australia.

Goal 1: Australian schooling promotes equity and excellence

Goal 2: All young Australians become:

- successful learners
- confident and creative individuals
- active and informed citizens (p. 7)

The Declaration goes further to elaborate on the implications of each one of these goals through a series of dot points—some of them will be exemplified below. The Introduction to the Australian Curriculum: Mathematics identifies three somewhat similar aims:

The Australian Curriculum: Mathematics aims to ensure that students:

- are confident, creative users and communicators of mathematics, able to investigate, represent and interpret situations in their personal and work lives and as active citizens
- develop an increasingly sophisticated understanding of mathematical concepts and fluency with processes, and are able to pose and solve problems and reason in Number and Algebra, Measurement and Geometry, and Statistics and Probability

- recognise connections between the areas of mathematics and other disciplines and appreciate mathematics as an accessible and enjoyable discipline to study. (p. 1)

Arguably, few people would disagree with the development of confident and creative users of mathematics, of a sophisticated understanding, skill and application of the content, and of an appreciation of mathematics as an accessible and enjoyable discipline as highly worthwhile aims for mathematics education. In particular we applaud the inclusion of terms such as "confident and creative users", "active citizens"; "accessible and enjoyable discipline" as well as the mention of the proficiencies along with the content in the Aims (notwithstanding the confusion referred to above in the articulation of proficiencies in the Content descriptions and their absence from articulation of assessment). Similarly, we note the partial overlap between the adopted Aims in the Curriculum and the Goals of the Declaration. The purpose of our reflections here is neither to present a comprehensive analysis of the similarities and differences between the two statements nor to analyse whether the stated Aims in the Curriculum are reflected in the main body of content selection and elaborations. Rather our purpose is to engage with both sets of Goals and Aims with respect to what type of purposes of education (à la Biesta) they represent, and to query the cohesiveness between the two.

First we note that two of the Aims identified above (2 and 3) refer to desired purposes of learning from *within* the discipline itself (Aim 2) and the overall school curriculum (Aim 3). In particular Aim 2, simplified, states that the student should develop proficiency *in* the content. Aim 3, simplified, states that students can "recognise" connections between mathematics and other curriculum subjects and enjoy its study. By simplifying them in this way we do not mean to devalue their importance, but rather to highlight that they refer to what it means to be a successful learner in mathematics from the perspective of the subject itself and from its position in the overall curriculum. However, the first Aim refers to a desired identity of a successful leaner of mathematics as a "confident and creative user of mathematics" who, in particular, is "able to investigate, represent and interpret situations" (p. 1). It sets the ground for going beyond the learning of/in the curriculum itself to the purposes of mathematics education itself. Hence, the very articulation of Aims of the Curriculum reflects the strong *learnification* discourse in education that Biesta notes. To highlight this point, we refer to the articulation of the Goal of schooling (sub-goal "to develop successful learners") as articulated in the Melbourne Declaration. The elaborations of that particular Goal identify "developing the capacity to learn", "obtain and evaluate evidence", "solve problems that draw upon a range of learning areas", and to "make sense of their world and think about how things become the way they are" (p. 8). The focus in these interpretations of the goal "of successful learner" is on ways of being and acting as an active citizen as a result of their experiences in schools. They are less focused on the level of disciplinary learning (including proficiency in it) than they are on the vision of an educated person as a result of their school experience.

In this context we note that while the learnification focus of the Aims of the Australian Curriculum: Mathematics does not necessarily avert the achievement of the Goals of the Melbourne Declaration, neither does it set out explicitly towards their achievement. We argue that this is not merely an arbitrary linguistic variation in conceptualising aims and goals. Rather it is a crucial difference if the curriculum is to play a leading role in reforming the practices in mathematics education in Australian Schools. Traditional teaching in mathematics, as noted by Bishop (1998) in the 1990s and as still holds in many schools, has tended to concentrate on concepts and techniques with a relatively limited level of direct applications. One could argue that in recent times this focus has been encouraged by a regime of testing that is increasingly determining the agendas for many schools. A shift of focus from what knowledge and skill is required in/by mathematics and in schools to a focus on what is required for a citizen to become a confident and effective user of mathematics in society would assure that mathematics is more aligned with the conceptualisations articulated in the Melbourne Declaration.

We now turn to a reflection on the purposes of studying mathematics (in other words what is mathematics good for in contrast to the Aims of the Curriculum itself). While the Curriculum does not specifically identify these different purposes, several purposes can be identified in its description of the different components. Perhaps they can be summarised as follows, in the order of their appearance in the document:

1. Competency in mathematics is useful for everybody in their personal life, work place and civic lives.
2. The three content areas specifically contribute to practices such as financial planning, design and interpretation of data to make informed judgements.
3. Mathematics is needed for certain professions and specialists.
4. Mathematics content is useful for other school subjects.
5. School mathematics builds foundations for further study in mathematics and beyond the school.
6. School mathematics allows students to appreciate the beauty, elegance and power of the discipline of mathematics.

Once again few would contest that mathematics is an important school subject for these, perhaps among other, purposes. In many ways they are very familiar to many teachers and curriculum developers around the world. However it is worthwhile to note that these are all individualistic constructions of the benefits of

mathematics, none of which highlights the public good stemming from a quality mathematics education in schools. Here we have in mind not only the benefits of mathematics to economic and technological developments of society, but also its benefits in the identification of social problems and its contribution to their management. If this contribution of mathematics to the general good of society is taken seriously, then not only will different purposes be identified, but also the examples given in the document of activities that teachers can use would be different.

Similarly, we note that these purposes are constructed from a perspective that sees mathematics as a fixed body of established knowledge and processes whose different uses are relatively certain and unproblematic. In another context, Thornton (2011) discusses the absolutist philosophies of knowledge that seem to be behind the construction of the Australian Curriculum: Mathematics and questions if these traditional views of mathematics are sufficient to construct a curriculum that will assist students in their future lives in times characterised by uncertainty and fuzziness. If alternative views of the nature of mathematics are adopted, then, for example, the usefulness of mathematics to other areas of study may be constructed in terms of possible conflict that may arise from the use of different knowledge bases in the solutions of real world problems, rather than simply from an unproblematic assumption that mathematics contributes to the development of knowledge in other school subjects.

The technical purposes identified above are consistent with the purposes of mathematics for *qualification* of Australian students in their personal and work lives. Further, such qualification itself may encourage more effective participation in civic and social life. However, this participation is different from the s*ocialisation* purposes discussed by Biesta. Above we acknowledged that a certain level of socialisation arises from experiences of students in any pedagogical activity—either explicitly or as a hidden curriculum. Here we take the stance that an unconscious and uncritical socialisation may contribute to the hegemony of objectivity and rigour of hard sciences such as mathematics that dominates political, social and educational discourse in the 21st century. If in mathematics education the "power" of mathematics is demonstrated without questioning the detrimental effects of such power (Simmons, 1999), if the usefulness of mathematics to other disciplines is presented uncritically without consideration of a possible conflict with the values of other knowledges, or if mathematics is not used to understand social life but merely only to function in it, then the socialisation of students through school mathematics may lead to an unquestioning privileging of mathematical knowledge and of the decisions based on it. Questions need to therefore be raised as to the nature of the socialisation it is desirable to achieve through the mathematics experience of school students. Such questions can then lead to a more holistic view of the purposes of mathematics and can, in turn, be reflected in curriculum decisions in terms of the content and pedagogy needed to implement such purposes.

Finally we raise the question of whether the above purposes reflect the role of mathematics in the *subjectification* of the student. The contribution of mathematics to the subjectification of the student cannot be realised when mathematics is seen solely as a technical subject that is useful in enabling people to function in work and society. However, when an alternative language is used to identify the "power" of mathematics, it can contribute to not only a critical understanding of how the world has come to be, but also to the development of the agency to change it. In the literature, such language is used in much of the critical mathematics education, ethnomathematics and mathematics for social justice literature. Constructs of *agency*, *empowerment* and the *transformation* of society are terms that can be used to highlight the subjectification purposes of mathematics. These purposes do not imply less mathematics knowledge, but more. As Ernest (2002) argues, empowerment of students in and through mathematics necessarily includes *mathematical empowerment* which consists of the ability to critically read and produce mathematical texts as well as to pose their own problems and solve problems. This may imply a very different selection and organisation of mathematical experiences.

Here we argue that the development of mathematics in isolation from the capacities developed in other areas of school curriculum limits the role of mathematics in achieving its transformative potential. In examining the claim of the Australian Curriculum: Mathematics to have a future orientation, Atweh and Goos (2011) summarised that

> the identification of content into the traditional mathematical fields of mathematics may be convenient in a syllabus, but it does not lend itself to dealing with real-world applications that often require cross-disciplinary approaches. With the increasing focus on overall capacities in thinking about preparing students for future, it is left to teachers to see how the content can be used to develop the cross-curriculum competencies, and the higher order proficiencies identified in the Australian Curriculum: Mathematics. (p. 223)

The implications of such purposes of mathematics to the curriculum are varied. A curriculum that aims to develop student *subjectification* places, at its centre, problem posing and authentic problem solving, mathematical reasoning, and critical thinking. However, this reasoning and thinking occurs not only through developing the mathematics itself, but also developing the ability to use mathematical knowledge in context of real world problems; it must also involve learning about mathematics itself - its assumptions, power and limitations.

Concluding Remarks

By way of conclusion, we will return to the question raised the title of this chapter. Does the Australian Curriculum: Mathematics represents a world class curriculum or is it more of the same? In developing the Australian Curriculum, the discourse of "world-class" was highlighted in political-speak as well as the many documents outlining the rationale of the curriculum and its dissemination. The Melbourne Declaration understands a world class curriculum as the one which, among other things, "will … support the development of *deep knowledge* within a discipline, which provides the *foundation for inter-disciplinary approaches* to innovation and *complex problem-solving*" (p. 13) (Italics added for emphasis).

In the discussion above we noted that the Content aspect of the Curriculum is its main organiser of the experiences that student are expected to engage in and achieve in their study of mathematics at all levels of schooling. Other worthwhile aspects such as Proficiencies, General Capabilities and Cross-curricular Priorities are presented as general statements and/or elaborations of the Content. In this chapter, we have not engaged with the question of Content selection as such. Our concern was with the rationale behind the content selection and organisation that may guide teachers and schools in their construction of their school curricula, pedagogical and assessment practices.

In this chapter we raise the question whether only lip service in the elaborations is given to the General Capabilities and Cross-curricular Priorities. Even the Proficiencies are not equally represented and give the impression that understanding and fluency are more important than problem solving and reasoning. Of course, the document does not specify this explicitly. However, teachers and schools are likely to construct their school curriculum to be along the lines of the Australian Curriculum: Mathematics. Not many educators would equate a focus on understanding of concepts and fluencies in procedures with the "deep knowledge" and "complex problem-solving" expressed in the Melbourne Declaration.

Similarly, the lack focus on conceptualisation and articulation of the most important purposes of learning mathematics in the first place is of little assistance to teachers to make decisions about what aspects of the curriculum are most worthwhile in planning their pedagogy and assessment practices. This also opens up the possibilities of designing school-based curricula that are far from achieving the national goals of active and informed citizens. Such goals can be achieved through engagement of students with authentic real world problems from the social life (Atweh & Brady, 2009) that lay the "foundation for inter-disciplinary" approaches identified by the Melbourne Declaration above.

Of course, what specific practices and outcomes might the Australian Curriculum: Mathematics inspire and achieve can only be speculated. One thing we can be certain about, based on years of research and experience, is that these practices would differ between schools with diverse visions and students from different backgrounds. However, we remain sceptical about the proposition that the Curriculum in its current form does provide a world class vision of what mathematics education can, or should, be like.

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