Concept-Based Curriculum and the Teacher: Galvanising Teacher Agency

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Introduction

With the current understanding about the teacher's critical role in the learning process (Barber & Mourshed, 2007; Hattie, 2009; Mourshed, Chijioke, & Barber, 2010), educators are now increasingly looking to involve teachers in ensuring greater customisation of learning. Educational systems are exploring more bottom-up approaches to curriculum development, as they seek to ensure that schools are equipping learners for the post-modern economy whilst at the same time deal with persistent achievement gaps and manage greater stakeholder involvement in education (Braslavsky, 2002; Darling-Hammond & Friedlaender, 2008; Garner, 2015; Kalantzis & Cope, 2006). School-based efforts have become test-beds to change instructional practices that have traditionally relied on centrally controlled, linear models of curriculum development (Brady, 1995; Gopinathan & Deng, 2006; Law & Nieveen, 2010). Teachers' role in curriculum has become important in leading the bottom-up approach to curriculum, and factors such as teachers' curricular expertise in selecting and conveying content suited to the learner in particular contexts (Ennis, 1994), professional learning opportunities (Cochran-Smith & Lytle, 1999; Timperley, Wilson, Barrar, & Fung, 2007) and teacher agency (Campbell, 2012; Fenwick & Edwards, 2010; Priestley, 2011; Priestley, Edwards, Priestley, & Miller, 2012) have become significant considerations in school-based curriculum development efforts. Specifically, given that such change depends on the active and reflexive engagement of teachers in their curricular contexts for action, teacher agency has become a critical determinant for the ongoing development and refinement of curriculum.

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This chapter therefore discusses the role that teacher agency plays in teachers' efforts at curriculum development, specifically in designing concept-based curriculum. The first part of the chapter explores teachers' efforts at curriculum development and how it plays a role in building teachers' capacity to address twenty-first-century learning needs. This is followed by a discussion of how teachers' involvement in concept-based curriculum, with a particular focus on ensuring deeper learning, can affect teacher agency, and explores this line of thinking in current conceptualisations of teacher agency in the literature. In the second part of the chapter, utilising a Deleuzian (Deleuze & Guattari, 1987) perspective of learning, knowledge and concepts, I argue that the development of concept-based curriculum galvanises teacher agency as it supports teachers' efforts at educational customisation to meet the needs of all learners and prepare them for the twenty-first century. In the final part, teachers' efforts at developing concept-based curriculum are considered in light of data gathered from a 6-year single site case study. The implications of such efforts for teacher expertise development and developing richer and transformative student learning experiences in teacher-developed curriculum will also be discussed.

Teacher-Developed Curriculum, Deeper Knowledge and the High Ability Learner

Teacher's efforts at curriculum reform are now seen as a viable way to help learners deal with the challenge of becoming life-long learners in today's complex, interconnected world (Fullan, 2000). In the literature, the term curriculum development can refer to both deliberate and unplanned curricular adaptions, triggered by larger policy changes or by smaller requirements such as accommodating the needs of learners (Cohen & Ball, 2007). However, in this chapter, curriculum development refers to the *planned* changes that are conceptualised and undertaken by classroom teachers *to meet learners' needs*. Even as teachers are the main drivers in such efforts, it must be noted that they often depend on and utilise wider networks that stretch across the classroom (Marsh, Day, Hannay, & McCutcheon, 1990), and these include researchers and experts working with learners with special needs.[1]

Traditionally, curriculum has been developed by subject specialists and disciplinary experts, with a clear focus on the rigour and depth of the discipline, whilst schools have acted as the implementers of the curriculum (Skilbeck, 2005). This process has continued in most educational systems which are centrally controlled and has been the case in most Asian contexts (Kennedy & Lee, 2008). When designing the curricula, experts tend to answer the question about what learning experiences

[1] Both curriculum development and innovation are used interchangeably in this chapter. Furthermore, the term curriculum development is used in its widest sense and refers to the appropriate selection and use of content as well as instructional strategies to achieve disciplinary learning and meet learners' needs in specific contexts.

in public education are significant to the cohort by selecting one of four main learning orientations, namely: the academic, experiential, technological or pragmatic orientation[2] (VanTassel-Baska & Stambaugh, 2006; Walker & Soltis, 2004). Most centralised education curricula have adopted the academic approach (Herschbach, 1989), which focuses on the significance of the rich academic and cultural knowledge heritage to the discipline, the whole society and to the individual (Tyler, 1949). In the academic rationalist orientation, disciplinary experts adopt a generalised, ideal picture of an archetypal learner in a typical school (Carl, 2009). Such an ideal profile of the learner is usually derived from psychological development and teaching theories such as those of Piaget, Maslow and Kohlberg. Disciplinary experts place a heavy focus on aspects of the subject discipline, setting up predetermined objectives for rigour in the curriculum, which ultimately requires the learner to know the facts and concepts that are deemed significant to the field. However, this strong focus on getting students to achieve a predetermined understanding of the key facts and concepts in the academic approach is argued as being inflexible as such lessons can lead to a one-size-fits-all format. Hence, even when the academic approach generates an appreciation of the key ideas and structures in the discipline, it is clear that taking only one of the four approaches to curriculum is unlikely to achieve parity in learning for all learners (Walker & Soltis, 2004).

In fact, Cheung and Wong (2002) have found that adopting different curriculum orientations alone does not result in greater learner engagement. Bottom-up curriculum approaches where teachers are involved in the design of curricula can offer significant bridges between the subject matter and the learner and can be more fruitful in creating meaningful engagement for the learner (Bolstad, 2004; Brady, 1995; Kärkkäinen, 2012). To this end, Kärkkäinen's meta-study of curriculum efforts in several OECD countries highlights how a very prescriptive central-level curriculum guidance may not allow teachers to bridge students' experiences and learning goals, as teachers lack ownership and commitment to change. In Asian societies, teacher's efforts at curriculum development are encouraged in a variety of ways in the hope that schools are able to offer learning experiences that are broader than that offered by the existing curriculum (Law & Nieveen, 2010). In the Singapore context, the 'Teach Less Learn More' policy was introduced to advocate instructional differentiation to meet learners' needs, so that teachers are able to teach the centrally developed curriculum to prepare students for high-stakes national examinations (Lee, 2004). However, meeting learners' needs using a top-down policy has indeed proved to be difficult and is stifled by several factors such as teacher commitment, competence and autonomy (Leong, Sim, & Chua, 2011). More bottom-up curriculum

[2] Curriculum orientations reflect decisions made about what knowledge is of most worthy in public education and are derived from the original five orientations set out by Eisner and Vallance (1974). Briefly, the four approaches are as follows: (1) academic rationalism approach promotes the ideas and structures within each discipline; (2) experiential approach promotes the development of a student's ability to think; (3) the technological approach aligns curriculum with how to assess and provide appropriate prescription of instruction and activities to students; (4) the pragmatic orientation focuses on developing students to solve social problems and participate in society.

efforts that are embedded in schools are now being called on and supported by the Ministry (Deng, Gopinathan, & Lee, 2013), but there is an inherent fear of loss of academic rigour when more control is ceded to the teacher, so the recurrent message has been one of 'decentralised centralism' in order to better manage change (Leong et al., 2011, p. 59).

Nevertheless, rigour and sustainability are perhaps more achievable if teachers, in designing curricula, can deliver broader learning outcomes than what can be achieved in the centrally developed curriculum. Teacher efforts therefore have to evolve from modifying the centralised curriculum to that of adopting content, concepts, sequencing and pedagogy to focus on the learner's experience in the discipline, placing less emphasis on factual learning and providing space for the growing understanding of abstract concepts (Skilbeck, 2005). The curriculum development processes therefore should be directed at transforming learners into autonomous thinkers with a deeper understanding of the discipline. It is this outcome that experts point to when they stress the need to design curricula that develop the learners' insights of the knowledge offered in the various disciplines (Dewey, 1902; Schwab, 1973; Stenhouse, 1975; Taba, 1962).

In doing so, teachers need to heed Reid's (1999) imperative of taking up a fundamental shift in the conception of curriculum from that of 'things to be learned' to that of curriculum as practice. Viewing curriculum as practice emphasises interpretation and meaning-making by the teacher (Grundy, 1987), which involves curriculum to be deconstructed and reconstructed as a vehicle for shaping of the meaning, insights and identities of the learner. Clearly teachers need to have the depth and breadth of knowledge that connects the learners' different cognitive processes with the structure of knowledge in the discipline (Erickson & Lanning, 2014). Current lesson experiences tend to focus so much on factual and procedural knowledge that learners do not make the 'important connections between and among facts and the larger system of ideas reflected in an expert's knowledge of a discipline' (Airasian et al., 2001, p. 70), an observation that has been raised in multiple disciplines (Bell, 2010; Boaler, Williams, & Confer, 2014). Specifically, in meeting the needs of high ability learners, the lessons need to be focused on what such learners do 'spontaneously'—their use of higher order thinking processes (Biggs, 1999, p. 57). Focusing learning experiences on conceptual connections can engage such learners better as it requires high ability learners to play an active and intentional role by requiring them to question, restructure and re-contextualise facts and skills to the larger concepts. The result is therefore more engagement for high ability learners in the short term and academic rigour and deeper understanding in the long term. Hence, for a high ability learner curriculum to provide transformational learning experiences and develop deep disciplinary knowledge, teacher-developed curriculum needs to stress concept-focused learning.

Concept-Focused Learning and the High Ability Learner's Needs

Erickson points out that concept-focused learning allows the learner to actively restructure their knowledge, develop autonomous thinking and acquire key twenty-first-century dispositions and skills (2002) such as self-directedness and life-long learning. Concepts are defined as 'sets of specific objects, symbols, or events which are grouped together on the basis of shared characteristics and which can be referenced by a particular name or symbol' (Merrill & Tennyson, 1977, p. 3). This learning conceptually involves incrementally connecting and re-representing the disparate facts acquired in the course of learning into a form that learners can call their own. Learning concepts is a thoughtful, engaging process because learners access and apply higher order thought processes, so that there is greater complexity, rigour, and integration of knowledge in the discipline (VanTassel-Baska, 1989; VanTassel-Baska & Brown, 2007). Transmission-based, content-focused curricula do not provide enough of such opportunities for learners, and therefore what is learned tends to be fossilised.

The incremental, thoughtful process in concept-focused learning is highly important for high ability learners as such learners often have a wider knowledge repertoire and exhibit faster thought processes. Often educators who work with such learners have to keep these fast thinkers engaged, and this is better done by getting the learners to exercise their own discretion through the use of a wider conceptual approach. For this reason, teachers working with high ability learners leverage on existing curriculum models such as the Integrated Curriculum Model (ICM) and the Parallel Curriculum Model (PCM),[3] as is apparent in the practitioners' accounts in the later chapters of this book, as these models are fundamentally concept focused to ensure a more engaging and customised learning experience. However, even as concept-based curricula have the potential of encouraging learning at a far greater depth and complexity for high ability learners, the teacher's agentic behaviour makes a strident contribution to developing and implementing such curricula.

Developing Concept-Based Curriculum Galvanises Teacher Agency

Teachers' involvement in the curriculum development process inspires deeper commitment and meaning-making in the teaching and learning process (Ben-Peretz, 1990; Connelly & Clandinin, 1998; Doyle, 1992). However, teachers' commitment and meaning-making process become more evident when they emphasise concept-focused learning in the discipline, both during the development and implementation

[3] For description and comparative review of these curriculum models, please see VanTassel-Baska and Brown, 2007 and VanTassel-Baska and Stambaugh, 2009.

stages. When teachers develop concept-focused curricula, they are personally faced with the task of retracing how the facts in the discipline are aligned together with the abstract concepts. They then actively experiment with instructional strategies, determining how they can get at the learner's background knowledge, tacit understanding and misconceptions in the discipline. At the same time, teachers would need to consider a wider range of affective, cognitive and metacognitive skills and dispositions amongst their learners as they select instructional practices and formative assessment tools to ensure that learners make conceptual links in the discipline. In short, by designing concept-based curriculum and adopting concept-focused learning, the teacher can help to nurture a broader and deeper appreciation of the discipline. This moves teachers away from being transmitters of curriculum (Brady, 1995), and instead they become the meaning-makers of the discipline. Furthermore, a focus on conceptual understanding ensures that the technical, practical (interaction) and emancipatory knowledge—interests that should guide fundamental human learning (Habermas, 1972)—are realised, so that teachers can realistically and reasonably prepare learners for life-long learning.

However, whilst concept-based curriculum can offer a more realistic way of preparing learners for life, traditionally, teachers have acted as curriculum implementers and knowledge transmitters. This lack of acceptance of the curriculum developer and learning facilitator roles is compounded by the depth of deliberation and work that is needed to develop concept-based curricula. Moreover, teaching conceptually may sometimes mean that the learner will leave the lesson with more questions than answers. Leaving learners in a place of doubt is often seen as the antithesis of good teaching and can put teachers in an uncomfortable place, especially if the existing social and cultural norms of education rest on giving learners the right answer. Given such complexities and the daily grind of working with so many learners, teachers will need to find the mental and physical energy to exercise their knowledge authority and thought freedom and feel confident about teaching the discipline conceptually whilst meeting the needs of the prescribed curriculum.[4] When teachers *do* exercise their knowledge authority and freedom to develop concept-based curricula, they arguably exercise agentic behaviour to become active advocates for how to (re)represent the discipline to their learners' in situ. Teachers' work in concept-based curriculum development is therefore dependent on the delicate relationship that arises when teachers become active agents of learning, and I briefly look at how this emphasis on teachers developing concept-based curricula interacts with teacher agency.

[4] It might be useful for teachers to become used to distinctions between two kinds of curricula- one which is prescribed and fixed, and a fluid one, where they have space for deliberation and experimentation of key ideas. This idea is taken up again later in this chapter.

Conceptualisations of Teacher Agency: Focusing on Promoting Deeper Learning

In current conceptualisations, professional agency is seen to be situated within the individual, who has the capacity to exercise free action based on his or her beliefs and values, and accomplish independent actions. Specifically, agency tends to focus on the individual's capability of carrying out action and not merely intentions (Giddens, 1984), and how the agentic action is free from social constraints (Calhoun, 2002). However, there is also an extant debate about the primacy of structure over agency and how structure affects agency by shaping social realities.[5] In elucidating the links between structure and agency, Emirbayer and Mische (1998) describe agency as being organised by three constitutive elements: iteration, practical and projectivity, and evaluation, which consecutively relate to time-specific orientations of the past, the present, and the future. Thus a chordal triad of agency is espoused, where all three dimensions resonate but not always harmoniously. This triad also sheds more light on the subjectivities of agentic action in the real world. Hence, at any point in time, an actor's action or agency is seen as 'a temporally embedded process of social engagement, which allows actors to critically shape their own response to a problematic situation' (Emirbayer & Mische, 1998, p. 963). Another recent theory posits a professional's agentic work as temporally embedded, so that the past training and background, current conditions and the future expectations are all considered and contribute to professional work (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2013). Thus whilst agency lives within the individual, each professional's practice happens in the midst of the socio-cultural conditions of the workplace as well as the professional identity, knowledge and competencies, and experience that make up professional practice.

However, despite the debates about the primacy of structure or agency in human behaviour, the power of individuals is still a necessary condition for agency. Biesta and Tedder (2007) extend this line of thinking to regard teacher agency as something that is achieved, rather than possessed, and draw on current ecological understandings of agency to describe the active engagement of teachers within their contexts for action. In further explorations of teacher agency, Priestley, Robinson and Biesta (2011) theorise an ecological view of teacher agency where teachers' agentic action is affected by the teachers' past experiences, current school and learner needs and future stakeholders' expectations. Drawing on studies of teachers' work with new curriculum, the teachers' agentic action has been found to be affected by factors such as the beliefs, values and attributes that the teacher calls on in a particular situation (Priestley et al., 2012). However, they also note that current conceptualisations of teacher agency are relatively under-theorised in the specific context of curriculum development (Priestley et al., 2012).

[5] Recent theories have made efforts at finding a "middle ground" and to blur the dichotomy between structure and agency as can be seen in arguments made by Archer (2003), Bourdieu (1984) and Giddens (1984) as well as the arguments made about the holistic and individualistic strategies used to explain agency (Hollis, 1994; Levine, 2005).

In arguments about professional agency in education, teachers are seen alternatively as agents of socialisation or as change agents (Campbell, 2012; Fullan, 1993). However, reform efforts such as school-based curriculum development can affect the teachers' identity as much as they call on more agentic action (Lasky, 2005). Given the multiple roles that each professional has to play, each identity of the teacher is referenced to the parts of the self that are attached to the roles that he or she plays in society. Teachers involved in curriculum development therefore would have to contend with a new professional identity, that of being a curriculum developer and a meaning-maker of the discipline. It follows then that in designing curriculum, the teacher's professional agency will manifest itself in at least two distinct ways—in maintenance of existing curriculum practices *and* in being an advocate of curriculum change. However, given that the professional identity can change according to the different circumstances (Stryker & Burke, 2000), even amidst this tension, there is constant shaping and renegotiation of the teachers' professional identity as they go about their work, and this affects the teachers' agentic action. When the teacher is going about changing curriculum to ensure that it is more concept focused, the teacher becomes an advocate for deeper learning and therefore calls on specific beliefs, values and attributes in order to achieve agentic action.

Two important questions arise when we look at how teacher agency is spurred on by teachers' work in developing concept-based curricula: (1) What are teachers change agents of? and (2) what is the teachers' purpose of change? Campbell (2012) pointed out that in curriculum contexts, teachers' agency can be framed by the essential question of 'agency for what?' and how the answer to this essential question frames the multiple actions of the teacher during curriculum implementation, interpretation, change and subversion. In traditional transmission-based models of teaching and learning, teacher agency is called on when teachers refine externally developed curriculum in order to socialise the learner into understanding the concepts that are the norm of the discipline. However, teacher agency in concept-based curricula emphasises the teacher's role in facilitating deeper understanding by questioning current mindsets and conceptions and in the process inviting the learner to create fresher links in the subject that was not seen hitherto. Whilst this facilitation of deeper understanding can happen sometimes in fact-based curricula, in concept-focused curricula, both facts and concepts are pushed to the foreground. Hence, when considering teacher agency in the curriculum development effort, the perspectives that teachers have towards the inadequacies of an existing curriculum in meeting current and future needs will have to be considered as well.

Additionally, Priestley et al. (2012) point to the iterative, practical and projective dimensions of teacher agency. This means that agency in the teacher's curriculum efforts is at least related to the ways that the teacher values teaching and learning, and this can help in investigating how teachers design curricular experiences that are compatible with these values that engage students. Teachers therefore become active agents of change in understanding the discipline, firstly at the personal level and then at the individual learner and classroom levels. In this sense, curriculum development, particularly, that of concept-based curricula, becomes a concrete handle by which theoretical constructs such as teacher agency and identity transcend

into the teacher's practice in the school. It is profitable to consider how teaching and learning conceptually change the teachers' view of what happens in learners and the outcomes that are expected, and this is explicated next using the Deleuzian post-structuralist theory (Deleuze & Guattari, 1987).

Teaching and Learning Conceptually: A Deleuzian Perspective

Concept-based curricula development brings to the fore the teachers' thought processes and the gestalt shifts that happen in their everyday practices as they work with different learners to achieve conceptual clarity. To do this well, I turn to Deleuze and Guattari (1987), contemporaries of post-structuralists such as Foucault and Derrida, and employ Deleuzian[6] philosophy to gather fresh insights into the role that concepts have in teaching and learning, how they engage the learner and the resultant changes in teachers' thinking and the curriculum development processes. Central to the Deleuzian perspective is the view that thought is dynamic and evolving and of life as creative and engendering diverse 'becomings' (Deleuze, 1995). Most significantly, this Deleuzian perspective allows us, educators and students, to visualise a transformation of modern life from the disciplined and controlled, to one in which one can seize opportunities to become inventive, creative and experimental (Colebrook, 2002). Using a Deleuzian perspective to look at learning and teaching offers important insights about what learning is, and more importantly, it problematises the role of concepts in engaging the learner. Three insights offered by the Deleuzian perspective of learning and its connections to the world of concepts are discussed in turn to understand how this can affect teacher agency in concept-based curricula.

An important insight offered by Deleuzian thinking is its notion of learning as being rhizomatic and of knowledge as being networked. The rhizomatic structure of learning is envisaged to be interconnected and, like never-ending biological rhizomatic roots, is seen to have planar and trans-species connections; the opposite arborescent model views learning as hierarchical with vertical, linear connections (Sotorin, 2011). In fact, the Deleuzian networked view of knowledge for teaching and learning is visible in current perspectives of knowing as being situated, embodied and distributed (Putnam & Borko, 2000; Rogers, 1997). Teaching conceptually requires teachers not to 'follow models of arborescent descent going from the least to the most differentiated, but instead as a rhizome operating immediately in the heterogeneous and jumping from one already differentiated line to another' (Deleuze & Guattari, 1987, p. 31). It then follows that in concept-focused teaching and learning, the task of facilitating the learners' search for knowledge and meaning-making is paramount and requires teachers to rethink their own ways of making meaning of knowledge. Hence, concept-based curricula signals the teacher to focus on the

[6] Deleuze and Guattari published together, and so in this chapter the reference to Deleuze is used to refer to their collective work.

active process of getting learners' to think about links within ideas in a discipline as well as across them, which is an important goal of classroom interaction. This way of thinking about learning offers parallels to post-modern proclivity for knowledge creation over knowledge transmission, therefore stimulating self-driven inquiries and connections.

The second insight stems from Deleuze and Guattari's position (1987) that a concept is more than simply a name attached to a subject or object. According to them, a concept is a way of approaching the world or, put differently, a way of *creating* a world through the active extension of thinking the possible and an extension to what it is not (Wallin, 2010). In this way, concepts extend experience through an affirmation of difference. Hence, what a concept *is* is of lesser significance than what it *does*, as concepts have a way of linking different things and feelings together. This therefore draws the focus in teaching and learning concepts to the conceptualisation process where 'the teacher and the learner co-respond, co-laborate and co-construct the territories of teaching and learning that they inhabit' (Gale, 2010, p. 306) so that concepts are re-examined and reframed together. Rather than a tool that purports to reflect an a priori reality, conceptualisation is seen as a core learning process that creates connections across premature understandings gained from multiple settings, allowing us 'to consider … a new way of conceiving being, the world, or what there is' (May, 2005, p. 116). Concepts are not ready-made or immutable structures beyond experience. Instead, concept-driven curricula require curricular material that is widened, in terms of depth, breadth and complexity, so that there is scope for the learner to form ideas and conceptualisation within the frames of reference in the field and in other lived experiences. Once again, the Deleuzian articulation of a concept as involving the conceptualisation process provides a more complex but realistic twenty-first-century relevant guide for managing the speed and complexity of learning. In this respect, it is free from the tensions of predefined disciplinary concepts that exist in the traditional curriculum and process of teaching. Instead, concept-based curricula provide teaching and learning spaces where ideas are actively created and recreated in the in-between spaces or cracks between crystallised discipline-specific ideas from thinking, discussion and experimentation.

The third insight pertains to the Deleuzian articulation of thought processes as experimentations that give rise to diverse 'becomings' rather than as (re)productions of the status quo. Learning in the Deleuzian perspective is not viewed as static but fluid. The creative effort is emphasised as each learner's trajectory is unique and requires connections that are wholly different. This articulates a view of learning that is consistent with twenty-first-century ideals, which has in Singapore been put forth via the Teach Less Learn More (TLLM) policy that has pressed for content reduction in the syllabus to create more spaces for innovation and experimentation. However, even as TLLM has been put in place to bring greater focus on processes rather than content in classroom practices, why should concept-based curricula be chosen? Putting concepts at the centre of curriculum and teaching allows for experimentation and thinking for both the teacher and the learner and therefore places the emphasis on the process rather than on acquisition of fixed understand-

ings of the concepts. Furthermore, if the Deleuzian perspective of building ideas and connections that pre-exist in the field is accepted, then using concept-based curricula can give rise to diverse 'becomings' rather than (re)productions of the status quo. Curriculum therefore needs to provide learning pathways that are co-constructed with learners (as individuals and as a class), an instructor, and external ideas that learners manage to pick up during the process of learning. This would relieve the pressure for teachers to ensure that there are opportunities to build self-directed and creative capacities in the lesson.

Enhanced Teacher Agency in Concept-Based Curriculum Development

The preceding discussion of the insights gained from the Deleuzian perspective of learning and knowledge has important implications for the nature of teachers' work in concept-based curricula. It points to enhanced teacher agency as the teacher figures out how to extend and transform learners' concepts for deeper disciplinary knowledge. Developing concept-based curriculum presupposes the notion of a common desire and labour at promoting discovery and meaning-making, inherent in any creative activity, but which is now directed at classroom learning. Each teacher in developing competence in promoting conceptual understanding therefore must direct and facilitate the learners' search for knowledge and meaning-making. Each teacher needs to accept and appreciate that developing conceptual understanding is less about arriving at a destination and more of 'becoming'. Agency is called on when teachers work in a space that is between the poles of knowledge authority and thought freedom. Thus there is a credible change expected in the role of the teacher in designing and implementing the concept-based curricula.

Furthermore, using a concept-based approach to curriculum rests on teachers making the rhizomatic links in the subject matter and acting in the 'experimental' mode in the classroom. When developing concept-based curricula, each teacher and team will go through a detachment and reattachment process, whether psychological or cognitive, as they work through their own conceptualisation process. Such attachment and reattachment processes require the teacher to be actively connected to their learners and the discipline, which calls on deeper teacher agency. To be better proponents of concept-based learning, teachers must themselves be ready for thinking and acting in 'experimental' modes. In such an experimental mode, the teacher will focus on 'becoming' rather than merely (re)producing current states of understanding, both in themselves and the learner. Hence, in developing concept-based curricula, the teacher needs to think about how to keep learning 'open' rather than 'closing up' learning by expecting learners to simply accept the teachers' knowledge authority. The concept-based curriculum development process therefore stimulates teacher agency as it calls on deeper considerations of their own disciplinary knowledge and greater teacher autonomy in providing spaces for learners to constantly interact with conceptualisations. The teacher agency in such a context

also requires more networks and rhizomatic, rather than arboreal, connections. Hence, teacher agency itself transforms from one that is static to one that stimulates the people in the field of action—the students, other teachers and experts—through constant interaction.

Concept-Based Curricula Development Sparks Teacher Agency: A Case Study

The Deleuzian insights about how teaching conceptually changes the teacher's view of classroom learning extrapolate well to the real-world situation as in this case study of curriculum work taking place in a specialised school in Singapore (L. S. Tan & Ponnusamy, 2013). This case involves a school offering a 6-year programme for 13–18-year-old pupils - the first independent, pre-tertiary school that focuses on both arts and academic learning (MICA, 2004). The school's leaders and teachers' vision of a connected curriculum (Perkins, 1993) requires learning to be connected, so that lessons engage and stimulate deeper thought. The Singapore curriculum is commonly described as highly centralised (Ng, 2008), driven by high-stakes examinations (Hogan, 2014) and politically and pragmatically forged to meet nation-building needs (Kennedy, 2013). However, recent decentralisation efforts have spurred ground-up school-based initiatives to build capacity in schools and teachers for curriculum innovation (Koh, Ponnusamy, Tan, Lee, & Ramos, 2014; Tan & Ng, 2007). Hence, the curriculum in this case study school was spurred by the school's and teachers' aspirations to meet the specific developmental needs of aspiring students intending to develop their artistic and academic passions and trajectories. In specific units, teachers chose a concept-focused approach where they had to think deeply about the what, why and how of curriculum and how this heightened teacher agency is described next.

Firstly, teacher agency was visible when teachers had to design learning as conceptual and rhizomatic. The teachers in the units that were studied began to work in experimental modes, so that classroom learning was seen to lead to diverse 'becomings' for both learners and the teachers. Tan and Ponnusamy (2013) argue that in negotiating the accountability demands brought on by Singapore's high-stakes examination system and ensuring learning was connected, teachers in their case study school created two kinds of curricula, the fixed and the fluid curriculum, and in this way resolved the pressures of constant experimentation. The teachers indicated that they had to focus on the fixed curricula, defined as that which contained the codified subject knowledge determined by the examining board. However, the school and its teachers also created a fluid curriculum defined as curricula that emphasised linkages and interactions between the learners' specialised needs, current interests and the academic subject matter, so that learning activities were primarily focused on interpretation, meaning-making and the expression of originality. Thus, whilst the fixed curricula directed the what, how and when of classroom learning for students, teachers also created specialised units of learning to

allow for the constant exploration of novel connections between the different disciplines. Hence, Tan and Ponnusamy (2013) describe teachers' accounts of lessons that require connections of ideas across different disciplines. The fixed and fluid curricula were used by the teachers iteratively in different contexts to address varying needs and they anchored the larger school curriculum vision of connectedness. More importantly, the iterative use of the fixed and fluid curricula featured greater integration of diverse knowledge. This favoured meaning-making and reinterpretation of concepts and ideas by both students and teachers - a case of experimentation and diverse 'becoming'. Hence, the development and implementation of the units called on agentic behaviours such as conducting lesson as 'experiments' with different permutations of concepts and thought processes, both within and across different disciplines.

The case study also found that in designing concept-based curriculum units, teachers needed to be able to work in interdisciplinary teams and envisage learning as happening beyond the traditional boundaries of subject matter that dictate classroom instruction. The teachers' actions of creating curricula were therefore focused on producing abstract and interdisciplinary conceptualisations in the minds of the learners and counter the emergence of fragile forms of knowledge (Perkins, 1992). Teachers proceeded to look beyond a single curricular experience for students and to use concepts as a way to constantly frame and reframe learning. Using Actor-Network Theory (ANT) (Callon, 1986; Mol, 2010) as a framework to guide the analysis, the study found that a complex web of networks between human and non-human actors resulted in and affected teachers' agentic behaviours. Actors in each network were found to actively convince other members so that there were common definitions of concepts at the heart of the designed curriculum unit. Hence, as the Deleuzian ideal of using the concept is seen as a way of understanding the world, teachers work on the concept-focused curriculum units and take the learners' present and future understanding and 'becomings' into consideration. For the teachers, concept focus of the curricula allowed teachers to traverse their own limiting and demotivating beliefs about the nature and importance of their own subject knowledge (Meirink, Meijer, Verloop, & Bergen, 2009). Such a change provided opportunities to review teachers' current and longer-term aspirations for learning, drawing on the practical and projective aspects of Priestley, Biesta and Robinson's (2013) ecological model of teacher agency. Clearly, developing concept-based curricula catalysed deeper changes to the teachers' actions and attitudes towards student learning and galvanised teacher agency.

Implications: Improvements in Teacher Expertise and Student Learning

If concept-based curricula can have the effect of galvanising teacher agency, then using a conceptual approach has important implications for teacher expertise development and student learning. As argued, concept-based curriculum development

calls on the teacher to be a reflexive practitioner, to become a researcher in the field (Ben-Peretz, 1980). These teachers would make teaching itself a focus of inquiry, laying open preconceptions and becoming aware of situational dynamics. They would have developed insights about how and when learners are jointly involved in knowledge production during concept-based teaching. Current research has found that experts rely on routine and adaptive expertise to achieve excellence when compared to novices in the same field (Bransford, Brown, & Cocking, 2000; Hatano & Inagaki, 1986). Whilst routine expertise relates to accuracy and efficiency, adaptive expertise focuses on innovation and creativity. Adaptive expertise is an important quality that teachers need so that they think outside the box to solve challenging problems or address atypical situations - a crucial part of meeting learners' needs. Clearly, when the development of concept-based curricula galvanises teacher agency, then there is a case for studying the kinds of expertise that teachers develop in the design and practice of concept-based curricula.

Teachers today hold different views and have different levels of expertise with regard to curriculum development. If concept-based curricula galvanises teacher agency, then more teachers will begin to question the role of curriculum in bringing about deeper learning and thus be empowered as they propagate new and revolutionary ideas to optimise teaching and learning experiences in the classroom. At the same time teachers will realise that such empowerment is not about unrestrained or unstructured action but about working collaboratively with other teachers and learners to enhance learner potential. They would move away from viewing the syllabi as fixed recipes and instead see them as key areas that they should experiment and change to make the learning more relevant and meaningful. To do this requires specific knowledge, skills and dispositions, and this is a level of expertise that is developed in such a process. Concept-based curricula development can be used to better understand how teaching expertise develops in the field, as it involves the cognitive and affective features or characteristics held by expert teachers, such as extensive pedagogical content knowledge (Shulman, 1986; Turner-Bisset, 2001), which includes deep representations of subject matter, knowledge and a greater sensitivity to the context (Berliner, 2001).

Lastly but more importantly, galvanising teacher agency through developing concept-based curricula will have especially vital implications for student learning. In fact, learning using a concept-based curriculum can alter the current tight coupling that exists between instruction and assessment in education today (Hogan, 2014). When students are constantly exposed to experimental ways of thinking and learning, they move out of the transmission-based mode of learning into a knowledge co-creation mode. Learning conceptually demands higher levels of intellectual involvement and questioning, which in turn is especially useful for keeping high ability learners engaged. Rhizomatic conceptual linking of knowledge offers powerful ways of thinking about knowledge, both within the discipline and between disciplines, thus reducing the fragile knowledge syndrome (Perkins, 1992). A concept-based curriculum also provides new ways of thinking about classroom learning for the high ability learner. Learning conceptually invokes the influential metaphors about what it is to learn, (un)learn and relearn in the post-modern world,

which suits the complex and sophisticated ways of knowing that high ability learners prefer. Clearly, the gains made on teacher agency by concept-based curricula will have significant short- and long-term benefits for teachers as well as learners, keeping them engaged as life-long inquirers and knowledge producers.

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