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Engaging the epistemic dimension of preservice teachers' identity: A pedagogical tool

Paper for Peer Review

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Abstract

A teacher's personal epistemology (i.e., their way of knowing) exerts a powerful influence on their ability to perceive and engage the diversity and complexity of educational environments. This paper introduces and illustrates a pedagogical tool for engaging the epistemic dimension of preservice teachers' pedagogical identity. The Binary Differential Grid (BDG) facilitates the development of increasingly complex, contextualised, and evaluative epistemologies.

A pilot study with 19 graduate level preservice teachers utilised the BDG to engage the epistemic dimension of five binary constructs related to teaching. The five binary constructs include, (1) teacher-centred and student-centred approaches to learning, (2) beliefs about natural and nurtured ability, (3) inclusive and exclusive approaches to diversity, (4) intrinsic and extrinsic approaches to motivation, and (5) permissive and authoritarian approaches to management. The study reveals the potential use of the BDG as a catalytic tool for epistemic development.

Keywords: epistemics, teacher identity, epistemological development, teacher education, Binary Differential Grid (BDG)

Introduction: The epistemic dimension of preservice teachers' identity

Epistemics reflects a concern with the cognitive, social and affective dynamics of real-world contexts that produce and transform ways of knowing. The premise of this paper is that a teacher's way of knowing (epistemology) interacts powerfully with their way of teaching (pedagogy). Schraw and Olafson (2008) note a need for future research to explore 'the extent to which the type and amount of preservice teacher education training affects epistemological and ontological worldviews' (p. 39). Accordingly, the intention of this paper is to introduce and illustrate a pedagogical tool for engaging the epistemic dimension of preservice teachers' identity.

Developmental theories propose a natural progression through qualitatively different and increasingly complex epistemologies. The general consensus of developmental theories indicates a movement from absolutist, to multiplist, to evaluativist ways of knowing (Tabak & Weinstock, 2008, p. 178). This direction complements the preferred sequence adopted in this paper, which

proposes the development of an increasingly sophisticated relationship between binary constructs. The binary construct most directly associated with epistemic development concerns *subjective* and *objective* knowledge. Kuhn and Weinstock (2002) succinctly summarise the developmental sequence of relationships between the binary:

> Initially, the objective dimension dominates to the exclusion of subjectivity. Subsequently, in a radical shift, the subjective dimension assumes an ascendant position and the objective is abandoned. Finally, the two are coordinated, with a balance achieved in which neither overpowers the other. (p. 123)

This development has important implications for the nature of teacher identity and related pedagogical approaches.

In the state context relevant to the preservice teachers in this study, Education Queensland represents a similar developmental approach to knowledge. For example, the *Productive Pedagogies* (2002) publication documents a continuum for the representation of knowledge. Movement from novice-to-expert teaching is seen to correspond to a movement from 'knowledge as given' to 'knowledge as problematic':

> Presenting *knowledge as given* is representing the subject content as immutable fact: as a body of truth to be acquired by students. The transmission of the information may vary, but is based on the concept of knowledge as being static and able to be handled as property, perhaps in the form of tables, charts, handouts, texts and comprehension activities.
>
> Presenting *knowledge as problematic* involves an understanding of knowledge not as a fixed body of information, but rather as being constructed, and hence subject to political, social and cultural influences and implications. Multiple contrasting and potentially conflicting forms of knowledge are represented. (p. 6)

Here, the use of a continuum represents a distinctively developmental approach[1] to epistemic identity.

The challenge for teacher educators is to find ways to implicitly engage the epistemic dimension of preservice teacher's identity, while avoiding mere surface level repetition of explicit theories and language of epistemological development. As Haerle and Bendixen (2008) claim in their examination of epistemic climate in elementary classrooms: 'Pre- and in-service teacher training, therefore, can make an important impact on the advancement of teachers' personal epistemology towards evaluativism' (p. 170). The pedagogical tool described and illustrated in this paper is offered as one way to make an epistemic impact in preservice teacher training.

Binary Differential Grid (BDG)

The BDG (Figure 1) is a pedagogical tool used to facilitate epistemological development from simplistic dualisms to contextualised understanding of knowledge. Participants use the BDG to

[1] Arguably, the Productive Pedagogies continua do not express well, the reconciliation of subjective and objective approaches to knowledge.

identify and record formative experiences, evidence, and attitudes in relation to a binary pair, in order to explore, (i) the complexity of relationships between binaries, (ii) the relativity and contextuality of binaries, (iii) the diverse experiences that produce identity in relation to a particular binary, and (iv) the role of structure in the organisation of experience and the expression of identity.

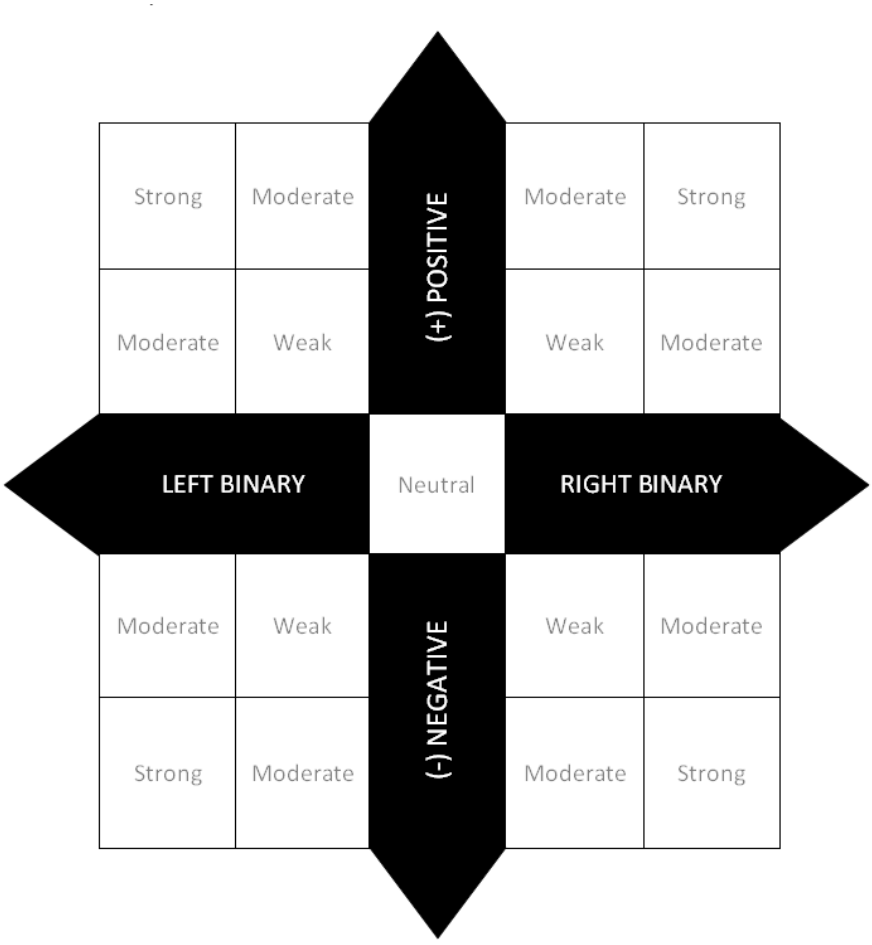

Figure 1. Binary Differential Grid (BDG): Sample Template. The Binary Differential Grid (BDG) is a pedagogical tool to facilitate epistemological development from simplistic dualisms to contextualised understandings. Participants identify and record formative experiences, evidence, and attitudes in relation to a binary pair in order to explore (i) the complexity of relationships between binaries, (ii) the relativity and contextuality of binaries, (iii) the diverse experiences that produce identity in relation to particular binary, and (iv) the role of structure in the organisation of experience and the expression of identity.

The structuring of binary relationships in sociocultural contexts can powerfully reveal epistemic identity (e.g., Reich, 2002; Perry, 1970). Binary relationships refer to the types of relationship (e.g., conflict, complement, negation) between the parts of a pair. A binary is a pair of concepts usually

related as opposites or alternatives (e.g., Liberal and Conservative, Traditional and Progressive, and Subjective and Objective). Binaries are relational, contextual, and interdependent. For example, 'in' and 'out' are interdependent constructs that 'make sense' in relation to each other, the context from which they arise and to which they are applied. Binaries are simple but powerful categories of knowledge. They are the basic organisers of knowledge that allow critical thought. This is because binary categories enable discrimination and selection between concepts and entities, and relative descriptions of concepts and entities. They allow the learner to choose one or the other and to locate their knowledge in relation to the knowledge of others. Binaries are the enablers of choice and decision that make knowledge powerful and meaningful. It is the distances that binaries both create and allow learners to see, which prompt learners to act and react. And, it is the differences that binaries both create and allow learners to see, that gives meaning to action and reaction. However, binaries can be de-contextualised (or pre-contextualised) which can lead to dualistic and dichotomising tendencies. Here, the structure of knowledge (the way of knowing or epistemology) dominates the accumulation and transformative possibilities of human experience. For example, teacher-centred or student-centred approaches may be viewed and valued, a priori, as 'good' or 'bad'. The broader purpose of this pilot study was to map and re-contextualise participants' epistemologies in order to facilitate more conscious and evaluative ways of knowing. This specific purpose of this paper is to identify and illustrate some epistemic dynamics that interact with preservice teacher identity.

The BDG utilises four main quadrants separated by a neutral space. The horizontal axis represents a spectrum between the left and right binary (e.g., nurture and nature). The vertical axis represents a spectrum between positive and negative values. This inclusion of this axis is based on the inextricable link between e*valu*ative epistemologies and value in the context of life experience. The top-left quadrant represents evidence, ideas, and experiences that provide support for the left binary. For example, a participant recalls a teacher who fundamentally changed their belief that they were 'born bad at maths' by showing them a new way of understanding mathematical problems. This quadrant complements the bottom-right quadrant, which represents negative valuations of the right binary. For example, a participant complains that a strong-nature view may lead to eugenic purging on a social scale and a neglect of socially disadvantaged children in the classroom. The top-right quadrant represents evidence, ideas, and experiences that support the right binary. For example, a participant may recall a study of identical twins separated at birth with statistically similar IQ scores in middle age. This quadrant is complemented by the bottom-left quadrant which represents negative valuations of the left binary. For example, a participant may recall being given a damaging false sense of confidence about their high-jump ability by a well-meaning teacher who was not realistic about the genetic constraints on their physical height. Collectively, the quadrants offer a visual template on which participants can map their knowledge and evaluation for any interdependent binary.

Each quadrant is sub-divided by another quadrant to help participants assign relative strength and significance to the experiences and ideas that are promoted by reflection on the BDG. The outermost sub-quadrants from the centre of the grid represent the most heavily weighted evidence. The inner-most sub-quadrants from the centre of the grid represent the most lightly weighted evidence. For example, participants may debate whether the evidence from identical twin IQ studies should carry more, less, or the same weight for the right binary (nature) than evidence from dog-breeding studies demonstrating the heritability of behavioural traits. The sub-quadrants also encourage participants to debate and differentiate the relative weights of evidence from personal

anecdotes, controlled studies, and past and possible, real and ideal scenarios. The sub-quadrants also encourage discussion to differentiate between value and evidence, and 'is' and 'ought' statements. For example, participants may debate whether the value and applications of eugenics has any bearing on the truth of the right binary (e.g., nature).

Finally, a neutral space is emphasised at the intersection of the vertical and horizontal axis. This space is significant given that the pedagogical purpose of the BDS is essentially to break down naïve binary oppositions in order to replace them with more complex, complementary, and contextual epistemological relationships. The space offers a visual prompt for participants to consider the contextuality and complementarity of binary relationships; to differentiate between a priori and a posteriori relationships; and to consider the whole validity of the binary construct under review. Collectively, the quadrants, sub-quadrants, and neutral space of the BDG provide a space for participants to explore the epistemic dimension of any particular binary construct. A pilot study with graduate preservice teachers utilised the BDG with five binary constructs related to teacher identity.

Binary constructs

There are many constructs that are of importance in the recognition of a teacher's identity. This study utilises five binary constructs on the basis of their frequency in teacher education literature and school discourse. Of particular relevance was the appearance of the constructs in the prescribed textbook for the preservice teacher participants involved in the study (i.e., Churchill et al., 2010). The following paragraphs offer a brief overview of each binary construct. Collectively, the constructs are used to represent significant considerations in teachers' everyday practice and the formation of teacher identity.

Binary construct 1. The first binary construct identifies teacher-centred and student-centred approaches. Teacher-centred and student-centred approaches to learning reflect an interest in the ownership and control of curriculum knowledge and pedagogy. Student-centred approaches tend to adopt a facilitation model of pedagogy that foregrounds student ownership over the selection and delivery of curriculum knowledge. On teacher-centred approaches, Churchill et al, (2010) note:

> The focus on the teacher is associated with a repertoire of activities and actions that have been central to the collective images of teaching for the last 150 years: the teacher standing at the front, talking, writing on the board, and controlling (at least in intent) virtually everything that takes place within the classroom. (p. 51)

Teacher-centred and student-centred approaches are often contrasted and represented in a developmental relationship. Arguably, the dominant relationship reflected in recent 'western' progressive education posits a development from teacher-centred approaches to student-centred approaches as the most desirable form of pedagogy. This progression is implicit in Churchill et al's (2010) lament concerning the 'overwhelming power of this taken-for-granted [teacher-centred] view of teaching' (p. 51). In epistemological studies of pedagogical views, Richardson (2003) and Wiedeen, Mayer-Smith and Moon (1998) claim that preservice teachers and beginning teachers are

more likely to have a teacher-centred view[2]. The centrality of teacher-centred and student-centred approaches in existing descriptions of teacher identity warrant its inclusion as a binary construct in this study.

Binary construct 2. The second binary construct identifies approaches to teaching that emphasise nature and/or nurture in student learning and behaviour. Teachers who emphasise nature tend to view their students' behaviour, learning ability, intelligence, and personality as inherited and fixed. Teachers who emphasise nurture tend to view their students' behaviour, learning ability, intelligence and personality as constructed and malleable. Walker and Plomin (2005) argue that a nurture-based bias can be found in western educational psychology and teacher training programs. However, their survey of 667 primary teachers revealed 'that teachers and parents appear to have moved beyond the nature versus nurture debate, and hold the more balanced viewpoint that both genes and the environment are important' (p. 515). Arguably, a teacher's view of the relative influence of nature and nurture in a particular domain (e.g., intelligence)[3] can have a powerful impact on their engagement or disengagement with some students. For example, a nature-biased teacher may offer less support to a student who scores lowly on an IQ test to improve their performance, than to a student who scores highly on an IQ test to apply their performance. A nature-nurture bias is as likely to affect teacher identity as it is to affect learner identity. Henderson and Dweck (Cited in Fives & Buehl, 2010) found that learners with nature-based beliefs about intelligence attribute poor performance to uncontrollable factors, whereas, learners with nurture-based beliefs about intelligence tend to attribute poor performance to laziness or external influences (p. 492). Thus, the nature-nurture binary construct is included because of its potential impact on teacher identity and its potential to be impacted by epistemological development.

Binary construct 3. The third binary construct identifies approaches to teaching that emphasise inclusive or exclusive approaches to student learning. Inclusive approaches tend to emphasise the student's 'right to participate and the school's duty to accept the child' (Churchill et al., 2010, p. 138). Exclusive approaches tend to detach 'groups and individuals from social relations and institutions and prevent them from full participation in society' (p. 138). Arguably, the modern Australian educational milieu is characterised by an historical and pedagogical view towards inclusion. This shift is similarly reflected in Education Queensland's (2002) continuum of practice for inclusivity. Here, development from novice to expert teacher is described as follows:

> (1) No activities recognise the varied learning needs of students from diverse backgrounds. (1) Several activities recognise the varied learning needs of students from diverse backgrounds. (3) Activities recognise the varied learning needs of students from diverse backgrounds for all, or nearly all, of the lesson. (p. 16)

The contrast between inclusivist and exclusivist approaches to education is an important binary construct in teacher identity that is arguably influenced by epistemic structuring.

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[2] The result of this pilot study offers an alternative finding that may (1) be a cohort anomaly, (2) reflect the different perspectives of mature-aged graduate students with more life experience, or (3) reflect a cultural or epochal shift.

[3] Walker and Plomin (2005) claim that 'no research has addressed the extent to which teachers' views of the nature–nurture question influence their method of instructing' (p. 515).

Binary construct 4. The fourth binary construct identifies intrinsic and extrinsic approaches to student motivation. Intrinsic approaches tend to value and foster motivation that arises from a sense of achievement and efficacy within the individual learner. Extrinsic approaches tend to value and utilise motivations from external incentives (i.e., punishments or rewards). Extrinsic and intrinsic approaches are sometimes aligned to behaviourist and humanist approaches, respectively. Accordingly, it seems fair to suggest that the Australian educational milieu reflects an historical shift from the privileging of extrinsically motivating pedagogies to the foregrounding of intrinsically motivating pedagogies. The centrality of the binary in teaching and the historical shift between poles is again evident in the core textbook used by participants in this study. For example, 'it is apparent that educators interested in promoting meaningful and engaging learning experiences must also be prepared to prime an individual's motivation to learn – and arguably do so on a level beyond extrinsic rewards' (Churchill et al., 2010, p. 118). The relationality (e.g., *in*trinsic and *ex*trinsic) of the binary makes it a useful construct in the study of a preservice teacher's epistemic identity.

Binary construct 5. The fifth binary construct identifies permissive and authoritarian approaches to behaviour management as a key consideration in teacher identity that may be influenced by epistemic identity. Authoritarian approaches tend to emphasise the non-negotiable control and responsibility of the teacher as creator and enforcer of rules. Permissive approaches tend to emphasise student agency in the establishment and organisation of rules, or more extremely, the abolition of rules and organisational structure altogether. The latter is seen as a way to engage students in the intrinsic construction of their own evolvable boundaries and guidelines. The current and dominant milieu of Australian education reflects an historical and pedagogical development from 'control' to 'engagement' in behaviour management. The authors of the textbook (i.e., Churchill et al., 2010) used by participants in this study, reflect: 'While the 'control' approach is dominant in schools and popular culture, it is the "engagement" approach, broadly speaking, that has come to be dominant in the normative research and policy discourses of education' (p. 56). This shift is further reflected in the language-shift from 'classroom discipline' to 'behaviour support' and 'safe, supportive environment' endorsed in modern policy documents (e.g., QCT, 2006). The construct of behaviour management has also been used in studies of epistemic identity. For example, Fives and Buehl (2010) identify classroom management as one of five central themes related to teacher's beliefs about teaching. Accordingly, the binary construct is used here to explore the relationship between teachers' pedagogical and epistemic identities.

Collectively, the five binary constructs offer a framework for engaging the epistemic dimension of preservice teachers' identity. Each construct represents an important theme in the construction of a teacher's identity. Specifically, the binary constructs are used to contextualise the following two questions: (1) How do preservice teachers' implicit epistemologies affect their explicit pedagogies? (2) How can implicit epistemic tools and activities (i.e. the BDG) impact preservice teachers' explicit pedagogies?

Context

The Binary Differential Grid (BDG) was embedded in the first introductory subject of a Graduate Diploma of Education. The subject introduces a range of theoretical approaches to the study of the histories, philosophies and practices of education. Participants were graduate level students (n = 19)

who gave informed consent for the collection and use of data related to the BDG. Participants, first individually and then collaboratively, completed four different binary differential grids during four focus group sessions, each of 1.5 hours duration. These focus groups were help on consecutive days of the week-long intensive subject. The binary construct for each day was explicitly linked to the content focus of lectures for that day. Participants submitted their completed BDGs with quantitative and qualitative data and reflections related to the formative impact of the BDG. These data were collected pre- and post- use of the BDGs in order to examine effects on participants' binary positions and relationships. It was anticipated that the impact of the BDGs would be revealed by either (1) a decrease of binary polarisations pre- and post- use, or (2) an increase in qualifications to polarisations referring to context. A lack of impact would be demonstrated by an increase or maintenance of binary polarisations over time sustained solely by exclusivist, oppositional, or compartmentalised rationales. For example, a participant who became more committed to teacher-centred approaches over time, regardless of context and in opposition to student-centred approaches[4].

Discussion and Analysis

This section offers a basic quantitative description and qualitative illustrations of individual change with the cohort related to the impact of the Binary Differential Grid. Table 1 reveals overall participant trajectories during the subject across the five binary constructs. For example, in the two-week period most participants decreased the polarisation of their identification with binary poles (i.e. Left or Right) in constructs 1, 2, and 5. However, most participants increased the polarisation of their identification with binary poles in constructs 3 and 4. This indicates that the nature of the binary construct is significant in that some binaries may be more easily decontextualised or cross-contextualised than others. It also indicates that participant identifications can change in relatively short periods of time. The subtleties and nuances of these epistemic dynamics could be explored with a larger study. The purpose of this pilot was to see if the use of an epistemic tool (the BDG) could catalyse participant awareness of context as a key factor in preservice teachers' identification with binary constructs.

The central assumption of linear theories of epistemological development is that movement proceeds from dualistic to multiplistic to evaluativistic ways of knowing. Evaluativistic ways of knowing are characterised by an awareness of context. It would be expected that indications of decreasing polarisations over time would be complemented by qualitative rationalisations accounting for an awareness of context. For example, one participant reflected:

> Context is a big issue to change some of my thinking . . . now theorizing that it all depends on other factors (subject, pupils, group dynamics) . . . both approaches are need to fit with certain situations, environments. (Participant 2: Binary 5:2-3).

A different participant also explicitly refers to a increasing appreciation of contextuality after the use of the BDG: 'My position moved towards the centre more as the old context chestnut came back into the issue . . . Depends on the context!' (Participant 12; Binary 5:2). Participants who explicitly

[4] These positions were quantitatively and qualitatively measured using a related Binary Differential Scale (BDS) (under review).

recognised contextuality over time tended to de-polarise their positions. Participants with the least movement over time tended to have well developed understandings of contextuality in the initial period. For example, one participant told the researcher that she had spent much time reflecting on the nature-nurture binary during her previous science degree. In the initial period she reflected, 'These two "sides" [Nature and Nurture] appear to actually be cyclically related, making it impossible to say one is a greater influence than the other' (Participant 13; Binary 2:1). Predictably, she maintained her position over the duration of the study. Other participants reflected on the formative role of their research in the week following the focus groups: 'After research and further reflection, I believe it is possible to incorporate the two approaches in classrooms. However, before choosing the learning approach, the subject/context needs to be considered' (Participant 19; Binary 1:3). Collectively, these responses typify an epistemic effect (i.e., knowledge is increasingly seen as contextual) on the domains of teacher identity examined in this study.

Table 1.

Epistemic Trajectories in Binary Constructs Over Time

Binary Construct		Epistemic Trajectory		
	n	Increased Polarisation	Decreased Polarisation	Maintained Position
1	13	23%	46%	31%
2	15	27%	40%	33%
3	7	43%	14%	43%
4	10	40%	30%	30%
5	10	10%	89%	0%
Average		22%	40%	25%

Note. Some participants switched polarity over time. However, their positions relative to a neutral position are used in the calculations for increased, decreased, and maintained positions. For example, a participant who became more committed to the left binary in the final period than they had been to the right binary in the initial period would be included as an example of increased polarisation.

There is evidence from the study that this epistemic appreciation of contextuality was fostered by the focus group. The focus groups were structured using the BDG and provided the main opportunity for participants to explicitly reflect on the binary with each other. One participant noted, 'My position came closer to the neutral following the discussion. Mainly because of the discussions around context. The context of a situation will determine whether a child-centred or teacher-centred approach is employed' (Participant 12; Binary 1:2). Another participant also noted the effect of the focus group in relation to the nature-nurture binary construct: 'Post-group session I became convinced that nature does have a role to play in hereditary intellectual capacity' (Participant 2;

Binary 2:2). The BDG works to expand participants' access to contents, experiences, and values associated with each binary construct. However, as participants encounter more contents, experiences, values and perspectives, they are faced with an epistemic choice between assimilation and accommodation. Participants with more relativistic epistemologies tend to find it easier to accommodate diverse perspectives by contextualising them. However, participants with oppositional or dichotomising epistemologies often find it difficult to maintain the integrity of perspectives that differ subjectively from their own. Similarly, those with multiplistic epistemologies may find it difficult to accommodate dichtomising epistemologies. The BDG tends to 'force the epistemic issue' (to accommodate or assimilate) by creating equal visual spaces for the representation of different values and perspectives. In order to illustrate some of these dynamics, Appendix A provides an example of a group BDG for the permissive-authoritative binary.

The BDG encourages participants to identify their own and others' subjectivities spatially. The BDG structures legitimate contextual spaces for the representation of subjectivities that may otherwise be seen to compete for the same space with opposing subjectivities. Participants may begin to *see* ways of representing otherwise competing subjectivities relationally, contextually, or complementarily. For example, one participant in the group who tended to emphasise the potentially negative effects of the right binary (bottom right quadrant) and the potentially positive effects of the left binary (top left quadrant), indicated a student-centred preference overall during the initial period: 'An authoritarian approach can lead to non-interaction – rebellion, whereas a permissive approach can lead to greater interaction' (Participant 2; Binary 5:1). However, the participant then engaged with the life experiences of fellow focus-group members. Some of these members spoke of their experiences related to the bottom left quadrant and the top right quadrant. These participants shared formative life experiences that revealed some of the potential negatives that they associated with permissive approaches and the potential positives of authoritarian approaches. For example, one student expressed their frustration at being unable to learn in a class that took advantage of the teacher's permissiveness. Another student expressed their cultural discomfort at the relative permissiveness of some Australian classrooms. Through inter-subjective sharing, the four quadrants of the BDG are all represented. Participants must either reject or ignore the integrity of their fellow participants' experiences to maintain their own polarisations, or re-contextualise their own subjectivities to better account for the multiple subjectivities of their group. The latter scenario seems to account for Participant Two's response *after* the focus group.

> Context is a big issue to change some of my thinking . . . now theorizing that it all depends on other factors (subject, pupils, group dynamics) . . . both approaches are need to fit with certain situations, environments. (Participant 2: Binary 5:2-3)

Arguably, this is illustrative evidence of the development of more sophisticated epistemic structures to better account for multiple life-experiences and related perspectives. As Bendixen and Feucht (2010) note in an introduction to personal epistemology: 'While some education programs and environments can advance epistemic development, others may have a counter productive influence' (p. 8). Arguably, counter-productive epistemic environments are those that have no space, place or discourse for engaging reflexively with the nature and organisation of the knowledge valued in that environment. In the context of teacher identity, the BDG offers one tool for advancing epistemic development by contextualising, decontextualising and recontextualising preservice teachers' self-identifications with a range of binary constructs relevant to teaching and learning.

Conclusion

Modern teachers work in increasingly fluid, diverse, and complex knowledge environments, though arguably, the epistemic processes and dynamics that organise, interpret, and interact with this knowledge remain fundamentally unchanged. The very human attempt to escape 'being human' by choosing once and for all between subjectivity and objectivity, may be as old as knowing itself. The challenge for modern educators is to create time, space, and place for the conscious reconciliation of knowledge and knowing. The BDG represents one tool applicable to some contexts for facilitating preservice teachers' reflection on the relationship between their own and others' personal subjectivities and pedagogical identities. To revisit Kuhn and Weinstock's (2002) description of epistemic development, the aim of the BDG is to contribute to the sophistication of teachers' relationship between subjective and objective knowledge, where, 'finally, the two are coordinated, with a balance achieved in which neither overpowers the other (p. 123). In light of the five binary constructs of this pilot study, the practical outworking of this epistemic sophistication affects the attention to, nurture, motivation, involvement, and management of learners.

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Appendix A: Binary Differential Grid (BDG): Sample content for Binary Construct 5.

• Positive social interaction • Discussion with problem students • More student involvement; more valued • Students can adapt and learn more • Caters for students' interests and needs • Democratic • Students can take ownership of rules • Attention to individual traits • Encourages respect • Encourages students-teacher relationships	(+) POSITIVE	• Some students need - culturally identify with structure • Demand for male primary teachers for strong discipline? • Provides a good working environment for learning • Stability • Young children need boundaries • Young children need to know what to do • Sports need discipline • Rules taught through family dynamics in some cultures • Direction and discipline is important for the 'real world' • Commando mentality and compliance • Kids prefer authoritative approach • Part of Aussie culture (Convict culture) • Can't assume that students have a background in social acceptance. • Set in ways • Encourages manly independence
LEFT BINARY (Permissive)	• Class and child dependent • Contextual • Authoritative • Developmental • Introverted vs. Extroverted considerations	RIGHT BINARY (Authoritarian)
• Can lead to anarchy – no learning • Students take advantage of freedom and don't understand the role of the teacher • Chaos and entropy • Loss of respect for teacher • No boundaries • Students need control (Lord of the Flies) • Entropic – everything descends towards order • Give and inch take a mile	(-) NEGATIVE	• Damaging effects of corporal punishment • Intimidation doesn't work • Limited creativity • Disconnection • Unproductive environment • Too black and white – dictatorial • Creates masculine heroes • Instill fear • Imposition of rule 'like it or lump it' • Lack of ability to take own direction later in life • Embarrassment • Potential for rebellion • Potential for abuse • Power trippers take out frustrations on students • Too scared to ask questions

Figure B1. This BDG represents some contextual information contributed by the pilot study focus groups in relation to the permissive – authoritarian binary.