REFLECTING ON A VOCATIONAL EDUCATOR'S THEORY OF PRACTICE: A CO-CONSTRUCTED ACCOUNT

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In this article, we report on how we used personal construct theory (PCT) methods in reflecting on the second author's (SA's) practices in vocational training for at-risk pre-apprenticeship youth in the electrical engineering and supply field. Our main aim is to describe the reflective process, especially how we raised SA's awareness of his pedagogical constructs and some of the implicative dilemmas in his pedagogical meaning-making. We provide a brief outline of a constructs-based approach, and what we mean by implicative dilemmas. Our method involves a case study to show how we used two PCT methods, constructs elicitation and repertory grids, in SA's reflective work. We found that SA was able to make explicit both his constructs and the conflicts in his meaning-making. His experiment with small-group learning and role definitions assisted him in resolving these dilemmas and diversifying his constructs. We concluded that PCT methods were useful in providing very specific prompts for reflective practice in this educational context. First author's (FA's) broader interest was to develop a constructs-based reflective approach for educators at a tertiary institute of technology.

Keywords: Implicative dilemma, repertory grid, vocational training, education, tacit knowledge

INTRODUCTION

Context

Brophy, Fransella and Reed (2003) observe that personal construct mentoring typically involves associates who engage in co-operative, developmental activity aimed at awareness-raising and solution-seeking change. We report on such a constructs- and evidence-based reflective process between an academic support staff member (FA) and a vocational trainer in electrical engineering (SA) in a tertiary institute in New Zealand. We reasoned that reflective practice would allow us to make explicit educators' tacit knowledge (Gascoigne & Thornton, 2013; Nonaka & Takeuchi, 1995; Senge, 2006), or in PCT terms, develop accounts of vocational trainers' (non-symbolised) non-verbal know-how (Kelly, 1955).

FA's broader concern was to illustrate the usefulness of PCT methods in drawing up individualised agendas for reflective practice in tertiary vocational training, and how 'workplace research' could be used to improve educator practices and lift outcomes for learners. In this article, our purpose is to report on how constructs elicitation and repertory grid analysis were used in reflective practice in vocational training. This article follows on Greyling, Belcher and McKnight (2013) who explored the usefulness of the repertory grid in triangulating an educator's and her learners' meaning-making on a pre-apprenticeship hairdressing programme.

A constructs approach

Kelly (1955; 1966/2003) contends that, on the basis of experience, each person develops a network of bipolar constructs (such as *like vs dislike*; *autonomous vs dependent learning; experiential vs instructional approaches to learning*, and the like*)* to make predictions about the future. The poles of a construct represent an aspect of difference, while they share an aspect of simi-

larity. For example, the construct *experiential vs instructional approaches to learning* identifies 'experiential' and 'instructional' as the aspect of difference, while 'approaches to learning' is the aspect of similarity.

Subsequent experiences allow the person to either validate or disconfirm the predictions. If predictions are validated, the person is able to assign meanings to the experience that she would deem useful and adequate in the context. The person may, but does not have to, improve her constructs and predictions. However, if her predictions are invalidated, she would be prompted to make one of three moves: use the same constructs to make new predictions, use different constructs to find more useful predictions, or create new constructs to make new predictions (Kelly, 1955).

Kelly (1955; 1966/2003) also refers to fragmentation, pointing out that inconsistencies often exist in a person's network of constructs. For example, a vocational trainer may firmly believe in active learner participation, prompted by his *active vs passive learner roles* construct. However, in practice, he may not allow learners enough time to respond to his tasks or elicitations, mediating their 'non-responses' too soon and depriving them of the opportunity to engage. Thus, his notion that learner responses have to be efficient and immediate turns learners into passive recipients of information – they are not given enough time to respond. Thus, his *efficient vs inefficient lag in learner response-time in training* construct is out of kilter with his notion of active learner participation and how such learning is accomplished.

Implicative dilemmas

We were interested not only in SA's network of constructs, but also in a specific form of inconsistency in his network, namely implicative dilemmas. A significant literature exists on the topic and how to identify conflicts, inconsistencies and implicative dilemmas in repertory grids (Badzinsky & Anderson, 2012; Bell, 2004; Feixas, Saúl & Ávila-Espada, 2009; Feixas & Saúl, 2004; Feixas, Saúl & Sanchez, 2000; and others).

Feixas and associates (2000; 2004; 2009) link implicative dilemmas to discrepant and congruent constructs. A discrepant construct, they point out, refers to an area where a person experiences a level of dissatisfaction which results in her viewing change as highly desirable, while a congruent construct denotes an area where the person would see no reason to want to change (Feixas & Saúl, 2004). Hence, we refer to an implicative dilemma as more than an inconsistency or ambiguity in a person's thinking; rather, it denotes an inconsistency or ambiguity that evokes a level of discomfort in a person which will prompt her to want to resolve the tension and ambivalence of not knowing how to act.

For example, a vocational trainer, using the *inquiry-based vs teacher-directed learning* construct, prefers *inquiry-based learning*, intending to assign learners tasks that require self-directed and independent learning. However, once she meets the group, she realises that to keep her learners on-task, she has to intervene, having to activate the opposite pole, *teacher-directed learning*. Thus, she cannot pursue the implications of her emergent pole because she perceives learners as inadequately equipped to deal with the demands of such learning. She employs a second construct, namely *activating appropriate vs inappropriate learner role definitions.* Her emergent pole, *inquiry-based learning*, prompts her to consider the negative implications of the opposite pole of the second construct, linking her learners' actions to *inappropriate learner role definitions.* She therefore feels herself stymied in pursuing an inquiry-based approach, and grudgingly she retreats into teacher-directedness as a strategy because it seems to her to be the most appropriate way of dealing with her learners. For this inconsistency or ambiguity to be an implicative dilemma, she has to experience a level of ambivalence and tension that will prompt her to want to change. Her challenge is to implement strategies that will assist her learners in developing appropriate learner roles to cope with inquiry-based learning. The question is then whether she perceives the implicative dilemma as resolvable or not (Badzinski & Anderson,

2012). To extend the example, a host of other constructs may come into play at this point, not least of these *cost vs benefit of change* (Badzinski & Anderson, 2012), *overt vs covert resistance to change* (Marshak, 2006), *imposed top-down vs negotiated bottom-up buy-in to change* (Hardy, Palmer & Phillips, 2000), and *high vs low urgency change* (Kotter, 2008), to name a few.

AIMS AND OBJECTIVES

Our main aim was to show that constructs elicitation and repertory grids were useful methods in setting agendas for academic support staff and vocational trainers to reflect on the latter's practices in vocational training. Specifically, we set out to describe and reflect on SA's teaching constructs that related to a pre-apprenticeship electrical engineering programme for at-risk youth.

We defined several objectives which emerged from our reflective conversations about SA's teaching. These were: to describe the process of embedding the two PCT methods in our reflective practice; illustrate how we arrived at an account of the elements and constructs in SA's meaning-making; design a grid; use the findings for reflective conversations between FA and SA to raise our awareness of his pedagogical meaning-making, including implicative dilemmas, if any; and collaborate in interpreting the findings.

We also provide a brief account of SA's self-initiated experiment with his learners to explore his view of the relationship between scaffolding, educator control and learner autonomy.

RESEARCH METHODOLOGY AND METHODS

We provide a brief account of our methodology and methods. PCT methods became relevant in our reflective conversations in the workplace, when at the appropriate time, FA suggested to SA that constructs elicitation and a repertory grid could assist us in going beyond discrete themes in his meaning-making to reveal the relatedness of clusters of meanings in his thinking. We outline our methodology to assist anyone wanting to replicate our process which lasted approximately for 15 hours of conversation from October 2013 to June 2014. We use the word 'replicate' in the knowledge that no two events are ever the same, and even if we were to 'replicate' the study, we would face newness and difference in our experience (Drummond & Themessl-Huber, 2007).

Preliminaries: Shared knowledge and experiences

We agreed that we had a well-established and ongoing positive, high-trust relationship (Dutton & Ragins, 2007) and that such a relationship was a key factor. We also had at our disposal an informal record of past conversations, two graphic outlines of key words and symbols (i.e. mind-maps) of SA's preferred teaching principles and practices, and a classroom observation. FA, who has an interest in PCT methods, had used constructs elicitation in these conversations. As prompts for reflection, FA and SA had discussed current and future practices; trainers deemed to be, or not to be, role models; traditional and more innovative approaches; and industry expectations. These became the elements in our small-scale project.

Step 1: From informal talk to constructs and a repertory grid

The first step was for FA to request SA to participate in a constructs-based analysis of his meaning-making. Once he agreed, we had a brief talk about constructs, how to define them, elements, and repertory grids as a numerical account of a person's meaning-making (Kelly, 1955). The anticipated value, we thought at the time, would be to see how different constructs were related in SA's meaning-making. FA pointed out that he had already captured several constructs from our conversations, the two mind-maps and a classroom observation.

Step 2: Imposing order on our input data

Using the input available to us, FA identified the elements, and tentatively, abstracted constructs on the basis of our conversations, especially SA's responses to conversational cues, consistent with dyadic elicitation (Fransella, Bell, & Bannister, 2004), such as: If you think about your current practices and industry expectations, are they consistent? How are they the same? How are they different? If you compare training that will produce innovative, problem-solving learners and your future practices, how would those be similar? How would they be different?

Step 3: SA validating the formulations

In this step, FA presented his tentative summary of seven elements and twelve constructs. FA revisited the input data, explaining the link between dyads of elements and constructs. SA accepted the elements. Although he agreed with the constructs, he contested the wording of some. We worked on the wording until SA was satisfied that the verbal labels came as close as they could to his view. Following Bell (2010), SA identified the emergent of each construct before FA designed the grid.

Step 4: Designing the grid

Next, FA developed a grid consisting of twelve constructs and seven elements, with the focus of convenience, as specified earlier. In the design, FA reversed the poles of six constructs. The grid consisted of 7 pages, one per element. Each page consisted of an element (see Table 2) and the twelve constructs (see Table 1), each of which requiring a rating on a seven-point Likert scale (Feixas & Cornejo, 2002; Fransella, et al., 2004).

Step 5: Eliciting and processing SA's ratings

SA completed the grid, page by page, without referring back, in approximately an hour. FA then applied grid-focusing, reversing half the poles of the constructs in the completed grid to align the emergent poles on the left side of the grid (Feixas & Cornejo, 2002). FA also converted the seven-point scale to a zero-point scale where 4 = 0, a rating of 1 = 3 and a rating of 7 = -3. He then processed the ratings in IBM SPSS (2013, Version 22), computing means, standard deviations, correlations for constructs and elements; as well as two cluster analyses, producing dendrograms which showed how ratings were configured for constructs and elements (Fransella, et al., 2004).

Step 6: Identifying implicative dilemmas

We used Feixas, Saúl and Sanchez (2000) as a rough guide to identify discrepant and congruent constructs. Discrepant constructs showed negative means located on the opposite poles (means < 0), while congruent poles would yield positive means located on the emergent poles (means >0). Means >-1 and <+1, we argued, signalled either conflict or confusion, revealing that SA was undecided on whether the emergent or opposite pole should apply. In addition, as specified by Feixas et al. (2000), the opposite pole of a discrepant construct would be associated with the emergent pole of a congruent construct, yielding a negative correlation, while the emergent poles of congruent constructs would show positive correlations. We noted Feixas and Saúl's (2004) salience point of 0.35, but then, following Cohen (1988), we opted for correlations of 0.6 or higher, and probability levels of 0.05 or less. These, we reasoned, were stringent requirements for identifying meaningful associations among constructs and among elements.

Step 7: FA's tentative interpretations and SA's response

In our follow-up, we agreed that FA would formulate tentative interpretations of correlations and the dendrograms. We discussed correlational pairs which captured congruent and discrepant constructs (6 pairs) and elements (6 pairs), as well as two dendrograms, one for constructs, and

the other for elements. For this article, we made a selection to illustrate our process.

Step 8 Resolving the implicative dilemmas

Although SA initially labelled his implicative dilemmas as unresolvable for at-risk pre-apprenticeship students, he nonetheless embarked upon an experiment. He opted for small-group tasks, carefully crafting step-by-step vocation-specific problem-solving tasks for active learner engagement. He also redefined his role as a "questioner and guide" rather than the traditional provider of information. FA was then invited to conduct a classroom observation to explore how SA was redefining his view of his *scaffolding* construct.

Step 9: Preparing a joint report

Our final step was to prepare a joint report (Greyling & Lingard, 2014) which was lodged in the institute's research archive as evidence of our reflective conversations.

Table 1: *Constructs for the repertory grid*

Construct: Emergent Poles	Construct: Opposite Poles
C1: *Develop multiple role relationships and practices through modelling [Congruent]*	C1: *Develop authority-based educator role relationships and practices*
C2: *Use scaffolds initially, and then eliminate them* [Discrepant]	C2: *Use scaffolding consistently throughout the course*
C3: *Explicitly stated sequential and step-by-step experimentation in learning* [Congruent]	C3: *Implicit and unstated sequence of actions in experimentation in learning*
C4: *Socialised into the community of electrical practitioners' socio-cultural practices* [Congruent]	C4: *Focusing on the individual in relation to the community of electrical practitioners' socio-cultural practices*
C5: *Intentionally create socially meaningful learning spaces for students to learn (from others)* [Discrepant]	C5: *Remaining within trainer-dominated learning spaces for students to learn*
C6: *Shape vocation-specific literate reasoning in a vocational context and authentic tasks* [Congruent]	C6: *Shape general literate reasoning in general contexts (regardless of context)*
C7: *Seek attention-grabbing instructional strategies* [Congruent]	C7: *Seek information-driven instructional strategies*
C8: *Extrinsic personal gain as a lever to motivate learners* [Congruent]	C8: *De-emphasising personal gain as a lever to motivate learners*
C9: *Audience-directed relationship-driven approach* [Congruent]	C9: *Specialist subject-orientated approach*
C10: *Experiential cycle of learning* [Congruent]	C10: *Instructional cycle of learning*
C11: *Holistic learning experiences [Mastery as vocation-specific reasoning, problem-solving, attitudes, values and practices]* [Discrepant]	C11: *Subject-focused learning experiences (selected theoretical electrical knowledge, reasoning and knowledge are key)*
C12: *Intentionally seeking and using associations and analogies to promote learner understanding and complexity of thinking* [Congruent]	C12: *Naturally allowing learners to make their own associations and analogies in developing complexity of thinking*

FINDINGS

We report on the following aspects: first, the selected constructs, elements and focus of convenience for the grid; second, the means, standard deviations and correlations for both constructs and elements; third, the dendrograms for constructs and elements (as part of a cluster analysis), a brief outline of some of the implicative dilemmas, followed by FA's tentative interpretations and SA's comments.

SA's constructs

Table 1 lists emergent poles on the left, with congruent or discrepant constructs indicated.

Elements and the focus of convenience

We identified elements from earlier conversations (See Table 2). The focus of convenience of the grid was 'teaching at-risk pre-apprenticeship students in electrical engineering'. Kelly's (1955) guidelines specify that role titles should be used; however, others have shown that typical practices or scenarios can also be used profitably as elements (Wright, 2008).

Table 2: *Elements*

Role 1: 'How you anticipate *industry* would want you to train your students'
Role 2: 'A tutor-trainer in your *field* who is currently a role model to you'
Role 3: 'How you view your current *practices* as a tutor-trainer'
Role 4: 'How you would want to teach in future'
Role 5: 'A tutor-trainer in your *field* whose training practices you reject'
Scenario 1: 'Imagine training in which the tutor-trainer's ultimate aim is to develop learners' roles and practices of independent, innovative, reasoning and responsive electrical engineering practitioners'.
Scenario 2: 'Imagine training in which the tutor-trainer controls all information and activity, and focuses on a limited range of topics to achieve limited, yet complete mastery of the so-identified content in teacher-controlled exchanges'.

Legend: Roles 1 to 4 & Scenario 1 = Positive and emergent elements. Role 5 & Scenario 2 = Contrastive, dispreferred roles and scenario

Table 3: *Means and standard deviations for SA's constructs-based ratings of elements*

Constructs	N (Elements)	Minimum	Maximum	Mean	Std dev
Construct 1	7	-2	3	0.43	2.07
Construct 2	7	-3	2	-1.00	2.09
Construct 3	7	-2	2	0.57	1.62
Construct 4	7	-2	3	1.29	1.80
Construct 5	7	-3	2	-0.86	2.04
Construct 6	7	0	2	1.14	0.69
Construct 7	7	-2	3	1.00	1.83
Construct 8	7	0	2	1.43	0.98
Construct 9	7	-2	2	0.00	1.92
Construct 10	7	-3	2	0.43	2.07
Construct 11	7	-3	3	-0.14	2.19
Construct 12	7	2	3	2.14	0.39

Means and standard deviations

We report the means and standard deviations for both constructs and elements. Positive means indicate ratings congruent with emergent poles, while negative means signal meanings located on the opposite poles. The standard deviations signal variability on SA's ratings. However, we realise that these means mask significant meanings captured in individual ratings.

Table 4: *Means and standard deviations for SA's elements-related ratings*

Elements	N (Constructs)	Minimum	Maximum	Mean	Std dev
Role 1	12	-2	2	0.17	1.80
Role 2	12	-2	2	0.50	1.24
Role 3	12	-2	2	1.08	1.51
Role 4	12	-3	3	1.75	1.60
Role 5	12	-3	3	-0.75	2.01
Scenario 1	12	-2	3	1.67	1.23
Scenario 2	12	-2	2	-0.67	1.97

The means for elements (based on 12 ratings on each) signal that negative means are associated with the negative and rejected role definitions of a teacher-centred approach and the undesirable scenario.

Correlations among constructs and among elements

We computed two correlation matrices, one for constructs and the other for elements. We report the matrix of Pearson correlations for the 12 constructs in Table 5, and for elements in Table 6.

Table 5: *Pearson Correlations for Selected Constructs*

Constructs	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
C2	-.85**										
C3	.76*	-.89**									
C4	.77*	-.89**	.97**								
C5	.81*	-.63	-.63	.67							
C6	-.63	.35	-.26	-.31	-.25						
C7	.93**	-.97**	.90**	.91**	.67*	-.53					
C8	.14	-.33	.45	.30	.38	.64	.19				
C9	.97**	-.75*	.75*	.73*	.81*	-.63	.86**	.18			
C10	.84**	-.97**	.91**	.87*	.66	-.28	.93**	.47	.80*		
C11	.90**	-.77*	.83*	.73*	.75*	-.43	.83*	.42	.95**	.86**	
C12	-.53	.64	-.43	-.36	-.46	-.09	-.48	-.65	-.46	-.73*	-.57

*. Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

Table 6: *Pearson correlation matrix for elements*

Elements	Role 1	Role 2	Role 3	Role 4	Role 5	Scenario 1
Role 2	0.41					
Role 3	0.63*	0.71**				
Role 4	0.33	0.75**	0.65*			
Role 5	0.47	-0.06	-0.04	-0.46		
Scenario 1	0.36	0.65*	0.65*	0.97**	-0.44	
Scenario 2	0.34	-0.30	-0.16	-0.58*	0.83**	-0.55

*. Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

Tentative interpretations and collaborative discussion

As noted, we had reflective conversations about 6 pairs of constructs and 6 pairs of elements, which were summarised in the institutional report, lodged in the institute's research archive and SA's personal portfolio of reflections. The correlations below include a congruent pair (Table 7) and a discrepant/congruent pair (Table 8), selected to illustrate the process.

Table 7: *Correlation of constructs 3 and 4*

Emergent x Opposite poles: Correlation: 0.97** [Congruent constructs]	
C3*: Explicitly stated sequential, step-by-step experimentation in learning*	C3: *Implicit and unstated sequence of actions in experimentation in learning*
C4*: Socialised into the community of electrical practitioners' socio-cultural practices*	C4: *Focusing on the individual as a future member of the community of electrical practitioners' socio-cultural practices*

FA asked SA whether he could validate and clarify the level of association between the emergent poles on the left. SA confirmed that explicit communication was key in learning in the electrical engineering field. This included explicitness about learner roles, practices and rules of engagement. Often, he stated, vocational practitioners would have to apply step-by-step routines involving thinking and doing. Such mastery was required to be deemed socialised into the practices of the community of electrical practitioners. Thus, he agreed that the emergent poles of C3 and C4 were associated.

Table 8: *Correlation of constructs 2 and 7*

Constructs 2 and 7: Pole A x Pole B Correlation: -0.97** [A discrepant x A congruent construct]	
C2: *Use scaffolds initially, and then eliminate them [Emergent, yet aspirational pole]*	C2: *Use scaffolding consistently throughout the course [Opposite pole, discrepant]*
C7: *Seek attention-grabbing instructional strategies [Emergent pole][Congruent]*	C7: *Seek information-driven instructional strategies [Opposite pole]*

We agreed that initially we had worked on the assumption that C2 Pole A would be associated with C7 Pole A 9 (both on the left). FA's question was whether there was a reason for the change from the emergent to the opposite pole of the construct (Opposite C2 Pole B) and C7 (Emergent Pole A). SA confirmed that his ratings changed when we narrowed the focus of convenience of the grid from mainstream to at-risk students. These students, he said, had major backlogs in their skills and knowledge. Often, they had misperceptions, acting in ways that posed significant health and safety risks. He would rather scaffold their learning, ensuring he offered them systematic learning of the basics required at that level, while at the same time he could assist them in clarifying their roles. SA associated pervasive scaffolding with very tight teacher control over classroom exchanges which typically exhibited tutor-dominated statement-question-answer-evaluation sequences (Bax, 2011; Greyling, 1995; Sinclair & Coulthard, 1992). It was this restrictive account of scaffolding for at-risk learners SA had to re-define.

Once he was certain that they had mastered the basics, he could give them more autonomy. In his view, this would most probably occur at higher levels once they had mastered the basics and had been socialised to act responsibly within their roles. Thus, the idea to eliminate scaffolded learning at all during the pre-apprenticeship phase of the training was aspirational. Scaffolded practice, SA argued, had to be supplemented by memorable, attention-grabbing instructional methods to ensure the at-risk cohort engaged in learning.

Correlations of elements

In this section, we report on three relatively high correlations among the elements in the grid (correlations>0.6). We selected the correlations below to illustrate the reflective process. We selected these correlations to show how SA viewed his tutor role in terms of 'his current versus future practices', 'current vs innovative practices' (scenario 1), and 'his anticipated future practices vs innovative practices' (scenario 1) elements.

Table 9: *Elements - Correlation of role titles 3 and 4*

Role title 3: 'How you view your current practices as a tutor-trainer'	Correlation: 0.65*
Role title 4: 'How you would want to teach in future'	

FA asked SA to agree or disagree with the claim that his current practices were associated with what he wanted them to be. SA responded that he felt himself firmly on the path, albeit that he sometimes experienced doubts, especially when he realised some students could not be rescued from failure.

Table 10: *Correlations of role title 3 and scenario 1*

Role title 3: 'How you view your current practices as a tutor-trainer'	Correlation: 0.65*
Scenario 1: 'Imagine training in which the tutor-trainer's ultimate aim is to develop learners' roles and practices of independent, innovative, reasoning and responsive electrical engineering practitioners.	

FA's question was whether SA agreed or disagreed with FA's claim that his current training practices came relatively close to those in a training context that replicated scenario 1. SA agreed, stating that he judged the direction of his practices to be consistent with this scenario. Another iteration of his teaching would be closer still to these practices. SA viewed his role as motion, movement on a path, an evolving process and a journey.

Table 11: *Correlation between role title 4 and scenario 1*

Role title 4: 'How you would want to teach in future'	Correlation: 0.97**
Scenario 1: 'Imagine training in which the tutor-trainer's ultimate aim is to develop learners' roles and practices of independent, innovative, reasoning and responsive electrical engineering practitioners'.	

FA's question was whether SA agreed or disagreed with the following claim: If SA had to imagine a future scenario (such as scenario 1), he would want his future practices to achieve those outcomes (i.e. the role definition and practices described in scenario 1. SA agreed, confirming the desired direction of his practices. It was clear that he viewed industry-ready learners to exhibit the skills, knowledge and attitudes referred to in scenario 1.

Cluster analyses of constructs and elements

We triangulated our interpretations of the correlated pairs, analysing dendrograms for the clusters of constructs and elements. The closer the distance between variables on the horizontal axis, the closer they are associated (i.e. Euclidean distances).

Dendrogram for constructs

The dendrogram indicates that the following relationships exist within the data set, and the discussion of the clusters appear after the dendrogram in Figure 1 below.

Constructs 1, 5, 9 and 11as implicative dilemmas

We noted that SA felt torn between the emergent and opposite poles of these constructs. This is reflected in the means for C1 (0.43), C5 (-0.86), C9 (0) and C11 (-0.14) signalling either confusion or tension in his construing. These are grouped in the range >-1 and <+1, hence the high correlations among these constructs. Using means and correlations, as well as SA's judgement of feeling torn between the poles of these constructs, he interpreted the cluster as follows:

SA felt that the challenges posed by at-risk pre-apprenticeship students forced him to revert to an undesirable tutor-centred role instead of collaboratively enacting multiple mentoring-type roles (C1); re-establish teacher-dominated learning spaces instead of intentionally creating socially meaningful spaces for students to learn (among themselves and with him as the trainer) (C5); and retreat into his expert specialist subject-matter role (C9 and C11).

In contrast, the emergent poles related to SA creating socially meaningful learning spaces and relationships in which learners could take initiative in their learning. The implicative dilemma was that group characteristics associated with at-risk students prompted SA to act in terms of the implications of opposite poles (bound together by the notion of teacher control) which conflicted with his emergent poles (of wanting to assign them tasks requiring initiative and responsibility).

Constructs 3, 4, 7 and 10

We concluded that SA was committed to the idea of explicitness in dealing with step-by-step

learning processes (C3). This cluster was associated with the notion that if learners had to be socialised into the community of electrical practitioners (C4), they systematically had to master vocation-specific reasoning. This objective, SA reasoned, could be achieved by employing attention-grabbing instructional strategies (C7), and adopting hands-on experiential cycles of learning (C10).

Constructs 6, 8 and 12

This cluster shows the anticipated association between *shape vocation-specific literate reasoning and actions in a vocational context and authentic tasks* (C6) and the view that learners responded to *extrinsic personal gain as a lever to motivate them* (C8). SA viewed learners as motivated by tangible positive results and personal gain. A tangible and immediate benefit had to be clear for learners to engage. One of his strategies was to assist learners in developing their competence deliberately to seek and use associations and analogies that supported learner understanding (C12).

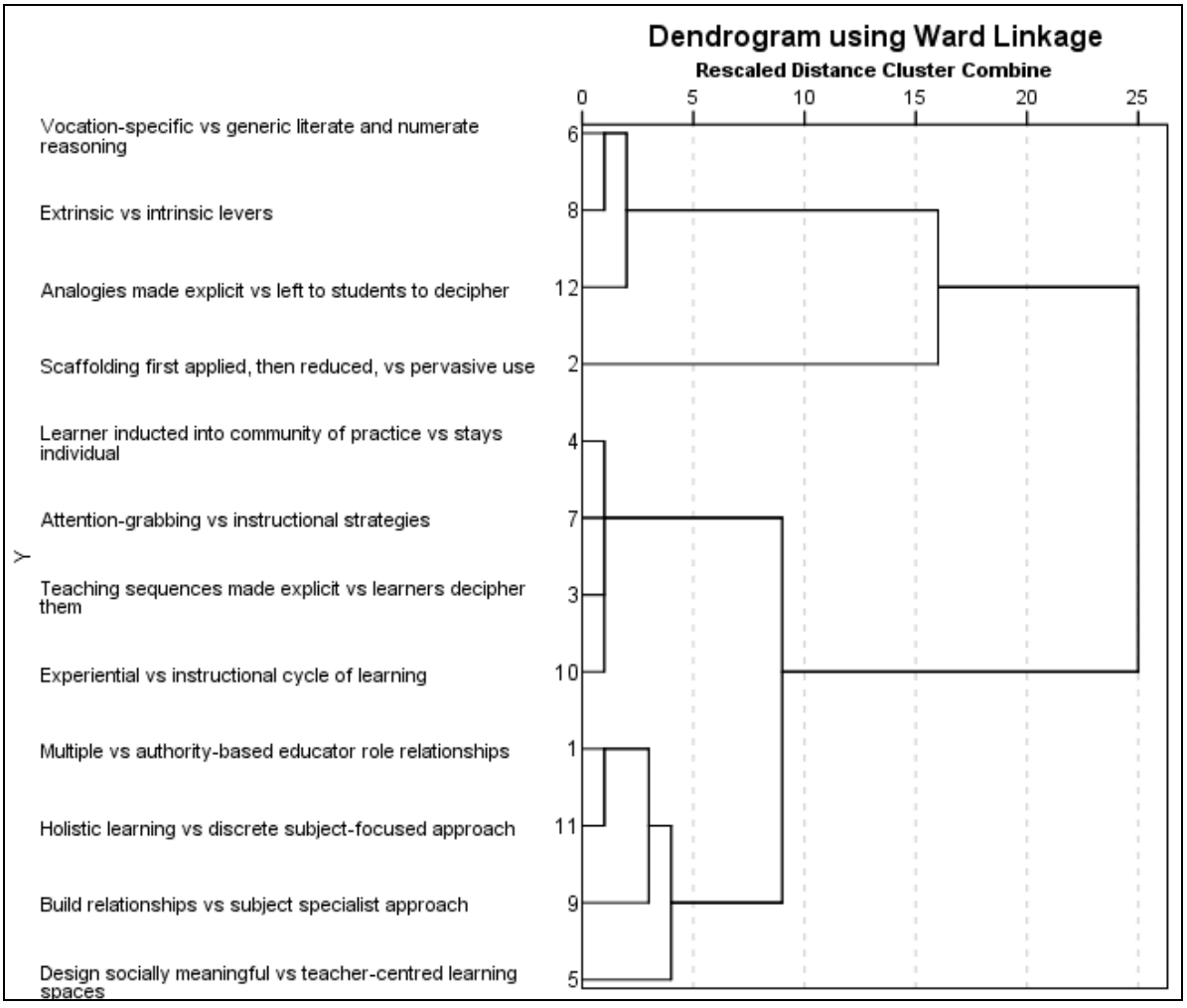

Figure 1: *Dendrogram for constructs*

Construct 2

As seen in Table 8, SA insisted that for the target group scaffolding had to be pervasive in the course (C2). SA viewed such scaffolded support and control as key in dealing with the target group who, in his view, lacked the maturity to be assigned any autonomy. Construct 2 is isolated from the rest of the constructs in the grid, confirming that this is a focal point in SA's experience of an implicative dilemma. The negative implication of pervasive scaffolding was that his learners might not meet the industry's and institute's work-readiness requirement. Instead, his pervasive scaffolding would lead to dependency, unemployability, and learned helplessness (Seligman, 2012).

SA associated the pole *pervasive scaffolding* with tutor-directedness, manifested as tightly controlled initiation-response-feedback (IRF) exchanges in tutor-student interactions (Bax, 2011; Greyling, 1995; Sinclair & Coulthard, 1992). Relevant information would be transferred to the group in a brief lecture followed by students completing relevant workbook activities, and then proceeding to practical application. His emergent pole, *scaffold at first, then gradually reduce support*, implied that students would receive progressively less support so that by the end of the module, they worked on their own, as he generally experienced with mainstream students.

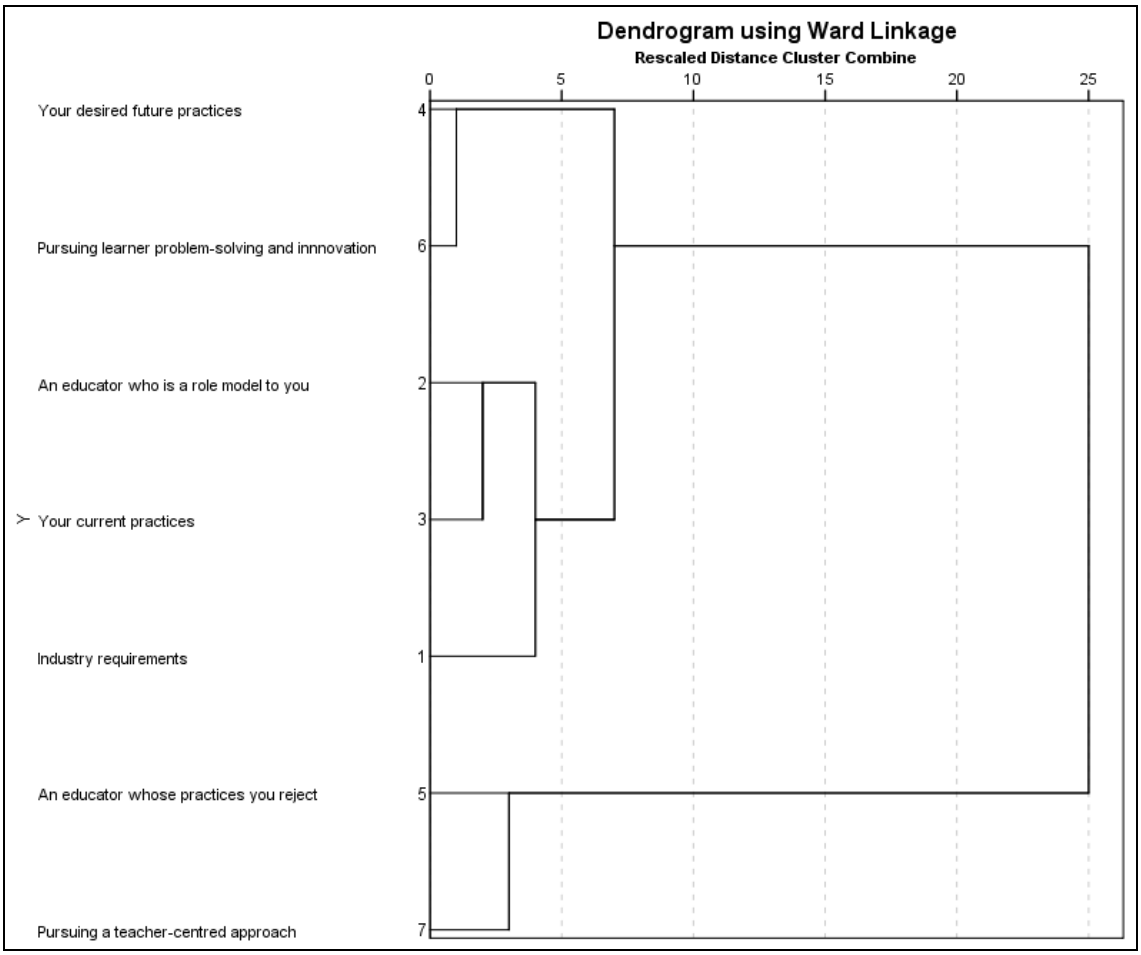

Figure 2: *Dendrogram of elements*

Alongside our reflections, SA experimented with tutor and learner role definitions, task requirements, and different interactional configurations in his classes. These experiments assisted him in changing his views of his delivery practices. We refer to the outcomes of his experiment in the discussion section.

We included the dendrogram for elements to show that in SA's meaning-making, captured in his ratings, the elements were associated as follows:

Role 4 (Element 4) and scenario 1 (element 6)

SA's ratings showed a positive correlation (correlation = 0.97**) which means that 'how SA would want to teach in future' is strongly associated with the positive scenario described in scenario 1.

Role 2 (Element 2) and Role 3 (Element)

In SA's ratings, there was a high level of association between how he perceived 'a tutor-trainer in his field who currently serves as a role model to him' and 'how he views his current practices as a tutor-trainer' (correlation = 0.71*).

Role 1 (Element 1) was moderately associated with Elements 2 and 3

SA's ratings suggest that his perceptions of 'how he anticipated industry would want him to train his students' were related to the 'tutor role as a role model' and his 'current practices' (elements 2 and 3). Although role 1 was associated with elements 2 and 3, we noted in Table 6 that the correlations between role 1 and these two elements were relatively low (with element 2, correlation = 0.41) and the only significant result the correlation with element 3 (correlation = 0.63*). SA's interpretation was that he perceived industry expectations as somewhat inconsistent with his perception of his and his colleagues' roles and practices.

Role 5 (Element 5) and Scenario 2 (Element 7)

For purposes of contrast, we included a negative role ('A tutor-trainer in your field you reject') and a negative scenario ('Imagine a training context in which the tutor-trainer controlled all information and activity, and focused on a limited range of topics to achieve limited, yet complete mastery of the so-identified content in teacher-controlled exchanges'). As expected, these two elements were highly correlated (correlation 0.83**); however, they contrasted with the other elements in the grid, as can be seen by the distance (25) between the negative pair and the rest of the elements, as well as negative correlations with other elements (See Table 6).

DISCUSSION

Eliciting an agenda for reflective practice

The findings of our small-scale intervention showed that constructs elicitation and repertory grid analysis were useful in identifying an agenda for reflective practice in a vocational context. These methods were valuable because they allowed us not only to elicit SA's constructs and implicative dilemmas (Table 1) in relation to various elements (Table 2), but also to explore how various poles of SA's constructs interacted. See, for example, the discussion of constructs 1, 5, 9 and 11 in Figure 1, and several pairs of interacting meanings in Tables 7-11.

Constructs are part of networks of meaning

What we noticed from our conversations was that any discussion of a construct led to our activating the implications of several related constructs. We made the link with tacit and explicit knowledge (Gascoigne & Thornton, 2013; Nonaka & Takeuchi, 1996), or in Kellyian terms

"non-symbolised constructs" (Kelly, 1955: 198). We realised that recordings and transcriptions of conversational data, when analysed, could serve as a valuable source of evidence of implicitly held constructs that evaded our attention in the immediacy of the

From implicative dilemmas to experimenting with new approaches

SA's construing of scaffolding was a very restrictive view of teacher-directed support. Such support was manifested mainly as tutor-dominated initiation-response-feedback (IRF) cycles of interaction, controlling content and learner actions, which is typical of such classroom discourse (Bax, 2011; Greyling, 1995; Sinclair & Coulthard, 1992). His experiment allowed him to begin to explore other options: he became a questioner, using extended sequences of IRF exchanges (White & Lightbown, 1984), guiding learners to use vocational reasoning in problem-solving tasks. He outlined the tasks, listing achievable steps for completing them, and the resources (capacitors, circuit components, and technology-enhanced course materials) needed. SA also used small groups of mixed ability, one per task, and imposed time limits for completion. SA worked the room, going from group to group, asking questions to check on learner reasoning. He responded to learner-initiated questions.

What SA discovered was that as the tutor, he was able to scaffold learning, provide firm task-related supports, and re-define his role as a questioner and guide. Tutor control and autonomous learner participation are not mutually exclusive: a tutor can control the design of activities and interactional spaces, yet secure a significant level of learner participation far beyond restrictive traditional IRF exchanges.

CONCLUSION

We concluded that our joint effort had shown that PCT methods were useful in supporting reflective processes. Vocational trainers' meaning-making systems, we contend, impact on their instructional choices. These methods are appealing because they honour the meaning-making of the individual, yielding opportunities for academic advisors and educators to create, abandon, reject or embrace meaning. We viewed the dendrograms from the cluster analyses as a valuable source of conversational prompts to explore the relatedness of multiple constructs and elements in SA's meaning-making.

We also noted four orders of reflective practice: first, eliciting SA's pedagogical constructs; second, co-designing, administering and processing the repertory grid; next, collaboratively interpreting means, correlations and dendrograms for constructs and elements; and finally, experimenting with new tasks and roles for both himself and his learners while co-writing this article.

In hindsight, FA believes that constructs should be defined in relation to observed classroom practices and activities. This would tie the reflective component directly to teaching acts. These, in turn, could be linked to meanings tutors deem to be critical in lifting outcomes for learners. This could be supported by laddering up, asking successive why questions, and laddering down, exploring the how of constructs (Fransella, et al., 2004) Second, the process was time-consuming. Although we agreed that our process offered valuable reflective opportunities, we concluded that applying repertory grids institution-wide had to be considered with care. The challenge would be how to extend the use of the repertory grid and other PCT methods across the organisation in ways that were meaningful, sustainable, effective and efficient.

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