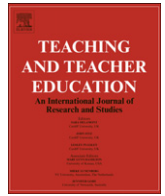




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## The role of teachers' orientation to learning in professional development and change: A national study of teachers in England<sup>☆</sup>

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### ABSTRACT

This paper uses results from a national survey of teachers in England to test a hypothesised model of teacher orientation to learning (consisting of beliefs, practice and experiences about learning) and its relationship to teacher learning change. Results from a structural equation modeling process of 1126 teacher survey responses show that teachers bring an internal, external and collaborative orientation to their professional learning. The beliefs and practices associated with these orientations are also shown to have a moderate influence, via path analysis, on teacher learning change defined as a composite outcome of change in beliefs, practices and students.

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### 1. Introduction

Recent efforts to understand the possible impacts of teacher professional development on improving schools, increasing teacher quality and improving the quality of student learning has led researchers and policymakers to focus on understanding the effectiveness of these activities. As the *OECD TALIS (2009)* study showed, teacher professional development is generally not meeting the needs of teachers in most countries. Because of these concerns, studies in multiple national contexts have attempted to explore why teacher professional development has failed to live up to its improvement promise and how it can do so in the future (See for example, *Meiers and Ingvarson, 2005* in Australia; *Piesanen, Kiviniemi, & Valkonen, 2007* in Finland; *Timperely & Alton-Lee, 2008* in New Zealand; and *Garet, Porter, Desimone, Birman, & Yoon, 2001* in the United States). In England too, a significant investment has been made by the Training and Development Agency for Schools in a new policy to improve teacher professional development (*Training and Development Agency for Schools, 2005*) and a program of research on the topic, culminating in the study *Schools and Continuing Professional Development (CPD) in England – State*

of the Nation Research Project (2009). This research program, though conducted in one national context, is influenced by the wider international research on teacher professional development. By drawing on this international literature, testing its assumptions and developing further conceptualizations, this research conducted in England, adds to our collective understandings of the difficulties of providing impactful professional learning to teachers.

The national study of teachers' professional development in England, recognises the overwhelmingly multi-causal, multi-dimensional and multi-correlational quality of teacher learning and its impact on teaching practices. As *Borko (2004)* states,

For teachers, learning occurs in many different aspects of practice, including their classrooms, their school communities, and professional development courses or workshops. It can occur in a brief hallway conversation with a colleague, or after school when counseling a troubled child. To understand teacher learning, we must study it within these multiple contexts, taking into account both the individual teacher–learners and the social systems in which they are participants. (p. 4)

Further, *Guskey (2000)* claims that teacher learning occurs every time a lesson is taught, an assessment is administered, a curriculum is reviewed, or a professional journal or magazine is read, such that the notion of professional development is not static but ongoing, continuous, and embedded in teachers' daily lives.

In this paper, we propose to model one part of these complex professional learning processes: those aspects related to the learning orientations of the teacher and the impact of these on

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professional learning and change. In assuming an influence of these individually held characteristics on teacher professional learning and change, we move beyond a singular focus on the features of the learning activity itself (Desimone, 2009) to consider the individual orientations to learning that mediate teacher change. In the following sections, we provide a basis for our hypothesised model from the extant literature on the relationships between teacher beliefs, practices and change. We specifically show how these literatures help explain professional learning that occurs post-initial preparation – that is, as a result of continuous professional development by teachers in post. After presenting our theoretical rationale for this model, we test the model using data from the national survey of teacher professional development in England. The paper concludes with a discussion of the implications of our model for understanding teacher professional learning and professional learning change in future studies.

### 1.1. Conceptualising teachers' orientation to professional learning

We hypothesise that teachers bring an orientation to their professional learning and this orientation contributes significantly to whether teacher professional change results from that learning. We consider 'orientations' to be an integrated set of attitudes, beliefs and practices as well as the alignment of oneself and one's ideas to circumstances and context. That is, learning orientations are heavily context dependent. Thus, we assume that while a part of teachers' orientations to learning may remain unchanged overtime, the influence of the context, the stage of career development, previous teaching experiences and the pupils a teacher has at any given time, are primary determinants in the orientation to what, how and why they learn as professionals.

Midgley (2002) and her collaborators have contributed a significant body of work on student learning orientations from a strictly psychological perspective. Relying on goal theory, these researchers have shown that students possess different orientations to learning and these orientations impact learning outcomes. This work, however, has never been extended to teacher learning. When teachers are brought into this research, it is in two ways – to understand how they impact student learner identities and then how they construct their own professional identities in ways that impact student learning. The research on student learning orientations has essentially tried to understand teachers' pedagogical choices and practices and the effect these have on students' motivation to learn.

Our conceptualisation of learning orientation is specific to understanding the professional learning of teachers themselves. We take a transdisciplinary, social-cultural approach rather than a psychological view toward the understanding of teacher learning orientations. A key difference between our approach and that of the student orientation literature relates to the focus of measurement in understanding learning orientation. We are interested less in how teachers perceive themselves than how they perceive their own learning (although how they see themselves contributes to how they see their learning). We make this distinction because teachers may hold an identity which they fail to act upon whereas we believe their orientation to be actualized. We are interested in addressing whether teachers hold an orientation to learning that encompasses both beliefs and practices, and if this orientation to learning is related to self-reported change. It is not our focus to identify types of orientations to learning. In our hypothesised construct of teacher learning orientations, beliefs, practices and the interaction between the two within a specific context are central. The literature related to our conceptualisation of these constructs and that of teacher change are discussed in the following sections.

#### 1.1.1. Teachers' beliefs about learning

As Hofer and Pintrich (1997) demonstrate in their review of research on epistemological theories, 'beliefs' have "been a particularly slippery term" (p. 112). Models of epistemological beliefs developed by psychologists have rarely included beliefs about learning and teaching in their conceptualizations. As Hofer and Pintrich (1997) have argued, "It is not clear if beliefs about learning, intelligence, and teaching should be considered as central components of epistemological beliefs." (p. 116) As a result of the exclusion of teaching and learning beliefs from this literature, research on belief specific to these contexts has developed in parallel to this psychological literature and definitions of belief related to teaching and learning have drawn on many fields for inspiration. For example, Richardson (1996) brings together research from anthropology, social psychology and philosophy to arrive at her definition: "Beliefs are thought of as psychologically-held understandings, premises or propositions about the world that are thought to be true" (p. 4). We place ourselves and our conceptualisation of belief within Richardson's line of inquiry.

For our research, the beliefs associated with teacher professional learning involve those general understandings related to learning that a teacher holds to be true. We extend this further to suggest that when these beliefs become important for practice, they manifest themselves as values for teaching and learning. That is, values represent not just what a teacher thinks to be true about teaching and learning but what they would give high priority to in their own practice. For example, a teacher may hold a belief about learning but she may also value it because it has served her and her students well. Thus value beliefs are personal characteristics that teachers bring to their learning. While we know of no research on learning values related to teacher learning, research on student learning values and their relationship to learning suggests that these values can predict attention, effort and willingness to learn (Eccles & Wigfield, 2002; Renninger, Hidi, & Krapp, 1992).

Our hypothesis that teachers' beliefs, practices and experiential contexts intersect and interact is not a new theorisation. As Green (1971) argued, "Teaching has to do, in part at least, with the formation of beliefs, and that means that it has to do not simply with *what* we shall believe, but with *how* we shall believe it. Teaching is an activity which has to do, among other things, with the modification and formation of belief systems." (p. 48) The recognised importance of teacher beliefs as critical to teacher practice and change has resulted in a proliferation of studies investigating these connections. For example, Burn, Hagger, Mutton, and Everton (2003), Novak and Knowles (1992), and Powell and Birrell (1992) demonstrate that beliefs are heavily grounded in past and present experiences.

Smylie (1988), in one of the only studies of belief and inservice teacher learning, concluded from a path analysis study of 56 teachers' professional development processes that "teachers' perceptions and beliefs are the most significant predictors of individual change." (p. 23) The organisational literature on learning provides a good example of how these beliefs may intersect and influence teacher learning practices. In some of this literature, schools have been shown to have both an internal and external orientation to learning and improvement. That is, schools that learn have a balanced reliance on external sources of knowledge and information and internal resources and capacity within the school itself (Drucker, 1995; Hallinger, 1998). March (1996) identifies this distinction as 'exploitation' and 'exploration'. Senge (1990) identifies these as 'adaptive' and 'generative' modes of learning. Encompassing all this work is the acknowledgement that some schools place greater value on external sources of new knowledge and information while others emphasise internal generation of knowledge. Getting the balance correct between the internal and

external orientations to learning may be the difference between a school that continuously learns and one that continuously engages in reform churn without real effect. Likewise, we surmise that this differentiation between valuing internal and external sources for learning may also have implications for how teachers' individual orientations to learning are constructed – that is, individual teachers may also bring to learning a predominately internal (reflective) or external (seeking) value belief but may also need to balance practices that involve an externally focused search for new ideas with internal reflection on teaching practice, beliefs and values.

Within their orientation to professional learning then, teachers bring beliefs in the guise of values that impact their own decisions about learning. The intersection of these values, their learning practices and their specific experiential contexts creates a powerful combination that determines not only the teaching decisions that teachers make (Richardson, 1996), but, also we would argue, determines what they themselves are willing to learn. Thus a teacher's learning orientation consists of not only their beliefs about learning but also how these beliefs interact with their experiences and their practice as teachers and learners.

### 1.1.2. Teachers' professional learning practices

Unfortunately, the beliefs and values brought to teaching and learning are not easily altered. In studies that have specifically attempted to change teacher beliefs to learning via course work and learning activities, few have been successful (Ball, 1990). Research studies demonstrate that teachers are more likely to attend to evidence supporting their existing orientations than to evidence that contradicts them (Chinn & Brewer, 1993; Tillema, 2000). Thus, "By and large, changes in belief during one academic class that is not accompanied by significant and structured involvement in a field experience either do not happen, or if they do, may be somewhat suspect because of measurement problems with the change measure." (Richardson, 2003, p. 11)

As a result of this understanding, a growing body of literature has focused on the features of professional learning practices and activities that lead to teaching change. In general, the literature expects change if teacher learning provides more and better:

- Classroom-based experiences (See for example, Linek, Nelson, & Sampson, 1999; Pigge & Marso, 1997);
- Opportunities for reflection (See for example, Carter, 1998; Peterson, Cross, & Johnson, 2000);
- Opportunities for understanding oneself in a secure environment under challenging or novel circumstances (See for example, Crawford, 1998; Johnson & Landers-Macrine, 1998; Yildirim, 2000);
- Applied knowledge about teaching and learning (See for example, Foegan, Epsin, & Allinder, 2001; Tatto, 1996);
- Collaboration with other teachers (See for example, Cordingley, Bell, Evans, & Firth, 2005; Jackson & Bruegmann, 2009); and
- Research led or research informed learning activities (See for example, Guskey, 2000; Hargreaves, 1996).

Despite the close identification of these elements with teacher learning and changes in teacher practices, few of these studies empirically connect the specific learning activities to specific changes in teacher belief. Fewer still go further to connect the learning activity to change in learning beliefs and then change in subsequent teaching practice.

Since teacher learning beliefs are acquired via teaching practice and experience, it is difficult for learning activities that rely on the transmission of new knowledge to alter what has been acquired through action. Thus, teacher learning change is more likely to

occur when learning activities have a conceptual and practical coordination or coherence across programs and activities (Feiman-Neimser, 1985). Tillema (2000) demonstrated that reflection after practice had a positive effect on belief change while reflection prior to practice did not result in belief change, resulting in unstable change of practice. Interestingly, because of the connection between belief change and experience, change resulting from teachers' learning may be easier to accomplish in inservice rather than pre-service teacher learning.

### 1.1.3. Intersection of belief and practice as a catalyst for professional learning

But how does an orientation to learning lead to an impetus for change? Wheatley (2002) suggests that dissonance between personal expectations and sense of efficacy may open up the possibility for teacher learning to occur – self doubt may cause reflection and may motivate teachers to learn. Posner, Strike, Hewson, and Gertzog (1982) and Pintrich, Marx, and Boyle (1993) suggest that a primary condition for conceptual change is dissatisfaction. The more dissatisfied an individual is, the more likely it is that the individual will seek out new understandings and new ideas. Likewise, Cobb, Wood, and Yackel (1990) discuss the importance of 'cognitive conflict' specific to teachers' thinking. They suggest that this cognitive conflict – or challenges to teachers' approaches and thinking – could be a motivator for change. Thus, dissonance between the ideal and the assessment of current capability that emerges from this cyclic interaction may result in a 'change-provoking disequilibrium' (Woolfolk Hoy, Hoy, & Davis, 2009).

Within our model of teacher learning, the relationship between beliefs, practices, learning and changes in practice are reciprocally causative. Interactions between these elements constitute an individual teacher's orientation to learning (see Fig. 1, below) and this orientation is evidenced in their beliefs, their teaching practices, their current context, and in the learning in which they choose to participate.

### 1.1.4. Teacher learning change

Thus far in this conceptual discussion we have referred repeatedly to teacher learning change. However, we find the extant conceptualisation of change within the literature on teacher professional development to be problematic and lacking in guidance for assessing change outcomes. As Richardson and Placier (2001) point out, "Radically different approaches to the concept of change have been used" (p. 905) in the teaching and teachers scholarship. A primary consideration for our own model then is how to conceptualise and consider changes that result from teacher learning. In some of the previous linear models of teacher learning,

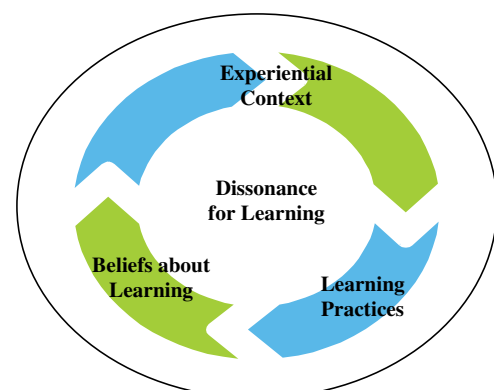


Fig. 1. Teacher orientation to learning.

especially those considering features of learning activities in isolation from individual and school contexts, change in belief leads to change in practice leads to change in students (Desimone, 2009). In others, change in practice leads to change in students that then lead to change in belief (Guskey, 2002). For example, Guskey (2002) asserts that “significant change in teachers’ attitudes and beliefs occurs primarily after they gain evidence of improvements in student learning.... It is not the professional development *per se*, but the experience of successful implementation that changes teachers’ attitudes and beliefs.” (p. 383) Thus, disagreement exists about the order in which the change sequence occurs.

We would assert that this disagreement arises because researchers have, in the first instance, considered change to be a linear process. We would also contend though that the disagreement about order has arisen because researchers have also seen these as separate, distinct, processes in the empirical–rational tradition. Huberman’s (1995) work on this topic demonstrated the cyclic nature of the change process for teachers: changes in beliefs lead to changes in practice that bring changes in student learning that bring further changes in practice that result in additional changes in belief and so on. The relationship between these processes is also reciprocal with changes in one being contingent on changes in another. Further, our reading of the literature on these teacher learning outcomes indicates that change can begin at any point in the change process – via belief, practice, change in students, etc. We assume this occurs because change does not just result from a linear process flowing from professional development activity but is also influenced by structural, cultural and political aspects of a teacher’s experiential context.

Thus, our conceptualisation of teacher change resulting from professional learning is more normative–reeducative than empirical–rational (Richardson & Placier, 2001). Within the normative–reeducative model, teachers are not seen as reluctant resisters to externally imposed change initiatives. Rather, this model understands that teacher change results from a complex process involving beliefs and practices and the way these interact with, and intersect with, context and structures in schools. In this way, our conceptualisation of teacher learning change has similarities to ‘hot’ models of conceptual change in psychological studies (Pintrich et al., 1993). That is, we see change being driven by personal beliefs, interests, motivations and social/historical contexts and processes rather than solely through rational and logical accumulation of knowledge and skills via participation in a learning activity.

Studies within a normative–reeducative theory of change have tended to rely on qualitative methods in order to recognise the dynamic nature of the processes at work (See for example, Hunsaker & Johnston, 1992; Little, 1992; McLaughlin, 1994; Moll & Diaz, 1987). While, for simplicity of measurement, the more linear conceptualisation made sense in the past for large scale studies of teacher professional learning, with the advent of more sophisticated multivariate techniques, it is now possible to consider processes and multiple mediators and moderators of processes that are complex and non-linear. As such, we believe the adoption of more dynamic conceptualizations of teacher change should not be limited to qualitative methodology. The primary implication for our model of teacher learning is that it assumes that for teacher learning to occur, change may occur in beliefs, practices, students or through any combination of these three areas of possible change. As a result, composite measures of change are needed and change in only one area would not constitute teacher learning. (See Fig. 2)

The model of teacher learning that we propose to test in this paper thus assumes that teachers bring beliefs and practices to their own learning and these beliefs and practices are situated in a specific context – the schools in which they work. Together, these

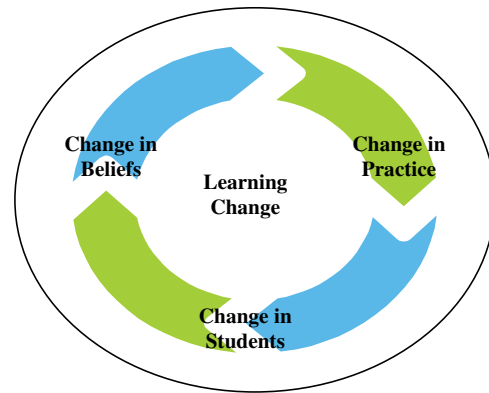


Fig. 2. Teacher learning change.

beliefs, practices and contexts constitute their orientation to learning which influences not only whether they learn from activities but also even whether they engage in certain learning activities to begin with. As a result of this strong determinative relationship between a teacher’s orientation to learning and engagement in learning, our model assumes that a teacher’s orientation to learning will have a direct impact on teacher learning change. Because the literature on learning change outcomes for teachers is opaque on directionality and sequence, we assume that three aspects of change – beliefs, practices and change in students – together constitute a better measure of learning change than any one of these measured singularly. Fig. 3 illustrates our hypothesised model and the relationships between teacher orientation to learning and learning change.

## 2. The study

Data for the analyses to test this model of teacher orientation to teacher learning were collected from a national sample of teachers in England. A sample of 388 schools (329 primary and 59 secondary) were randomly selected from England’s National Foundation of Educational Research (NFER) database of schools to be representative of the whole of England’s publicly funded, school population in terms of region of the country, school type, location (rural versus non-rural), achievement band of school and proportion of pupils eligible for free school meals. The NFER database of schools is the most complete listing of schools available in England. No population list of teachers is available for England or even by school from which to sample teachers. As a result, sampled schools were asked to have all their teachers complete the surveys. The lack of a national population list of teachers and school specific staff lists means that an accurate return rate for teachers cannot be established. The return rate at the school level was 39% with 36% of primary schools and 56% of secondary schools surveyed responding. Questionnaires were deleted from the sample if less than 80% of the items were complete and are therefore not included in the response rates or findings presented. Responses from 1126 teachers in these schools are included in the analyses presented in this paper. This sample size is significantly larger than previous studies of teacher professional development in England and proportional in size to similar studies conducted in the other national contexts.

Comparing the demographics of responding teachers to national population estimates, we found that responding teachers match national proportions within  $\pm 2\%$  on: ethnicity, gender, school level of employment, position type, career stage and years experience. A closer look at teacher ethnicity provides a good example of the closeness of our achieved respondents to the population. According to Department for Education and Skills statistics (2005), 91% of



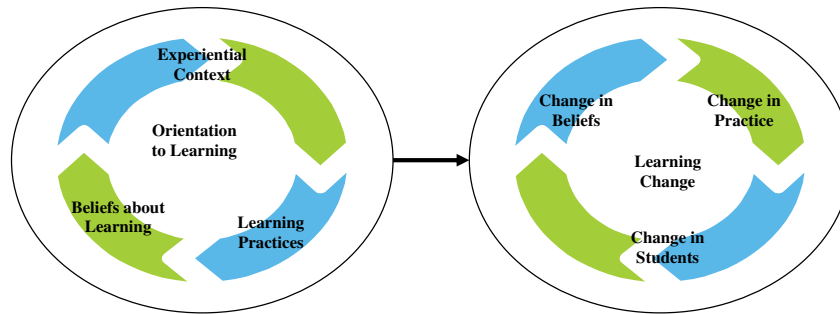


Fig. 3. Teacher orientation to learning influence on learning change.

teachers identified themselves as White British, 2% as Asian, 1.5% as Black, and 0.5% as Mixed. Of teachers responding to our survey, 91% identified themselves as White British, 1.5% as Asian, 1.1% as Black and 0.04% as Mixed. With such close matches between respondents and population estimates at the teacher level of our sample, we feel confident that the study presented here does represent national patterns of teacher learning in England.

2.1. Instrument

The data from the survey of teachers reported here focused on individual learning practices and value beliefs for professional

learning. Teachers were asked to make two kinds of responses to 14 questions. The first response focused on teachers professional learning practices in which teachers are engaged. Staff could choose from the following response categories: not true, rarely true, often true and mostly true. The second response focused on their own value beliefs, indicating how important they felt a particular professional learning practice was for them (See Fig. 4 for an example of this dual format). The response categories were: not important, of limited importance, important, or crucial.

In addition to these questions on teacher value beliefs and practices related to learning, teachers were asked a series of 14 questions to assess the types of impacts that engagement in learning activities had for them and their students. In reporting these changes, teachers were asked to consider those professional development activities in which they had participated in the previous 12 months. The questions had a 4 point Likert format of impact – not at all, not a lot, quite a lot, and a lot and are reported here as learning change outcomes.<sup>1</sup>

3. Data analysis procedures

Survey responses from teachers were entered and analysed originally in SPSS. Mean score imputation was used for all missing data since missing data accounted for less than 1% for all variables and the survey as a whole. Model testing followed initial descriptive analysis using AMOS in two phases. In the first instance, we needed to determine whether our data matched our theoretical understandings of teacher learning orientations and change in teacher learning – that is, to test our measurement models. Given the complexity of these measurement models and the number of latent variables involved, separate beliefs and practices models for teacher orientation to learning were developed. Once these measurement models were tested and refined, our second phase then analysed the predictive relationships between these measurement models to test the structure of the hypothesised

<sup>1</sup> One possible criticism of our methodological approach is its reliance on self-report data, especially about teacher change. We believe criticisms of teacher self-report survey data are unfounded for three reasons. First, this study focuses on self-report related to teacher learning identities. In a study on a related topic, Roeser, Marachi, and Gehlbach (2002), studying teachers' professional identity, argued that "teachers subjective perceptions of their work environments are stronger determinants of their identities than are more "objective" context features." (p. 218) Also, the student conceptual change literature places such primacy on the importance of beliefs in the change process (See Pintrich et al., 1993) that when teachers believe that they have changed, this should serve as an appropriate and plausible proxy for 'real' change to have occurred. That is, we do not believe that you can have a construct dependent upon belief and then dismiss reported beliefs and perceptions as invalid outcome measures. Second, we believe that some of the criticism of self-report measures conflates the data obtained from interviews and other openly interpretive measures with that collected via closed ended surveys. Supporting our point, Vaisey (2009) has found that, "interviews may not be the best way to understand how people make judgments. Carefully constructed and implemented, forced-choice surveys may be better suited to the study of the culture-action link." (p. 1688) In comparing the results from interviews and surveys in his own research, Vaisey (2009) concludes that, "Well-designed survey questions may measure practical knowledge better because they present the respondent with situations that are homologous with everyday decision-making processes.... When we hear a survey question, we simply have to pick the response our practical consciousness prefers, the response that "feels right" or "sounds right" to us.... In the same way, we may be able to rely on respondents' choices [on surveys] to gain insight...and to predict their future behavior." (p. 1689) Third, our construction of our teacher self-report measures takes into account our understanding of the methods literature on ensuring reliability of teacher self report. Self-reports of teaching practice have generally been found to be consistent with other measures such as observation and classroom artifacts when teacher's descriptions are linked to specific practices and activities (Burstein et al., 1995; Mayer, 1999; Rowan & Correnti, 2009; Smithson & Porter, 1994). Teachers' self-reports tend to be less reliable when they are asked to provide quality judgments about practices or when they are asked about pedagogical concerns not tied to specific practices. Our survey format tying teacher values about a practice to a specific description of a practice should result in more reliable estimates of teacher's beliefs than questions that ask them about their values in absence of practice. Further, the 12 month time period was used for questions of change because other researchers have demonstrated that when surveyed at the end of a year, teachers have been shown to have good recall of practice and changes in practice for that given year (Gamoran, Porter, Smithson, & White, 1997; Porter, Kirst, Osthoff, & Schneider, 1993). For these reasons, we feel confident that our measures accurately reflect teachers' orientations to learning and the changes that have resulted from professional learning activity in which they engaged.

ABOUT YOUR PRACTICES				ABOUT YOUR VALUES			
How true of your professional learning are these practices?				How important are these practices for creating opportunities for you to learn?			
Not true	Rarely true	Often true	Mostly true	Not important	Of limited importance	Important	Crucial

Fig. 4. Example of dual format questions for teacher survey.

model – the influence of teacher orientation on learning change. Thus our modeling processes are best described as a model development approach. That is, we are primarily interested here in establishing a causal descriptive rather than causal predictive model. We hope that future research on these ideas and conceptualizations can result in a causal predictive model.

### 3.1. Measurement model development process

In our exploration of our hypothesised model of teacher professional learning, we first had to establish whether our theorised constructs of the model fitted our teacher survey data. To do this, each element of teacher learning orientation was modeled separately using Amos. Refinements were made to each measurement model in order to improve both the latent variable and model fit overall. Following typical model refinement processes, individual questions in a measurement model were deleted if they had high covariation across latent variables (according to the modification indices for the model), if they harmed construct reliability, or if they negatively impacted model fit. In going through this process, only one measurement model required refinement (internal orientation to learning). Parallel structure in the measurement models for beliefs and practices in the teacher's orientation to learning were maintained in the refinement process – that is, as the measurement model for internal practices was refined, the same refinement was made in the internal value beliefs model. This parallel refinement process led to better model fit in both the practices and beliefs models thus reinforcing our dual scale measurement formulation and indicating that teachers hold beliefs specific to practices. Table 1 illustrates the refinement of the internal orientation measurement models.

In addition to refinement of latent variables, our model development processes led to some refinement of the structure of our measurement model for teacher orientation to learning. The teacher orientation to learning model was adjusted during testing to achieve better fit with the teacher survey data. The latent variables remained intact throughout the analysis but adjustments were made in the way these variables were thought to relate. Fig. 5 compares the structure of these measurement models before and after adjustment.

Our analysis of the measurement models that we had hypothesised to construct a teacher's orientation to learning illustrated that a research orientation is not sufficiently embedded in either teachers' beliefs about learning or their learning practices to be considered essential to their overall orientation to learning. It remained in our structural models for both teachers' beliefs and practices but as a separate latent variable from orientation to learning which encompassed an internal, external and collaborative orientation. (See Fig. 6 for an illustration of the complete structural model).

**Table 1**

Latent variable refinement during model exploration for teacher orientation measures.

Refinement of teacher learning orientation measurement model	
Original internal orientation with questions	Refined internal orientation with questions
I modify my practice in the light of evidence from self-evaluations of my classroom practice.	I modify my practice in the light of evidence from self-evaluations of my classroom practice.
I experiment with my practice as a conscious strategy for improving classroom teaching and learning.	I experiment with my practice as a conscious strategy for improving classroom teaching and learning.
I consult pupils about how they learn most effectively.	I consult pupils about how they learn most effectively.
I reflect on my practice as a way of identifying professional learning needs.	I reflect on my practice as a way of identifying professional learning needs.
I modify my practice in the light of feedback from my pupils.	DELETED

By refining both the latent variables and the structure of the measurement models, we were able to establish constructs that fit the data at both the latent variable level and also at the level of the structure of the measurement models. We used two measures to establish model fit – the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). The CFI compares existing model fit with a null model that assumes the indicator and latent variables are uncorrelated. By convention, CFI should be equal or greater than 0.90 to accept the model. This would indicate that 90% of the covariation in the data is explained by the model. RMSEA was chosen as a fit measure because it is considered a better measure for complex models in that it penalizes for parsimony. Schumacker and Lomax (2004, p. 82) suggest that a model has good fit with an RMSEA less than or equal to 0.05 and adequate model fit if it is less than or equal to 0.08. Bollen (1989) suggests that establishing an acceptable model fit should not rely on an arbitrary cut-off. Rather, he suggests that model fit should be established in comparison to other, prior models of the same phenomenon. For example, a CFI of 0.80 may indicate good model fit if prior models had only achieved 0.70. Because we are not aware of any prior modeling of teacher learning, the hypothesised models presented here establish a baseline for future modeling of the phenomenon.

## 4. Results

Results are presented in three sections. In the first, we summarise responses to survey items included in the measurement models. Given our two phase model testing analysis (development of measurement models, then testing of structural models), our modeling results are reported in two subsequent sections. In the second section, we report results of model fit for the measurement models teacher orientation to learning and teacher learning change. In the third, we report how a teacher's orientation to learning impacts teacher learning change. Beliefs and practices in orientation were modeled separately. However, the relationship between beliefs and practices of teachers is presented to further support our hypothesised structural model indicating that beliefs and practices, jointly, constitute an orientation to learning.

### 4.1. Summary of responses to survey

In every instance, teachers' value beliefs about their professional learning outstrip their practices (See Table 2). Teachers are strongest in their beliefs ( $m = 3.38$ ) and practices ( $m = 3.32$ ) related to their internal orientation to learning. That is, teachers have fairly high levels of belief and practice related to reflection, modifying, and experimenting as individual teachers. Teachers also have moderate levels of belief ( $m = 3.17$ ) and practice ( $m = 3.19$ ) regarding external sources of information and knowledge about their professional learning. Teachers have lower levels of belief

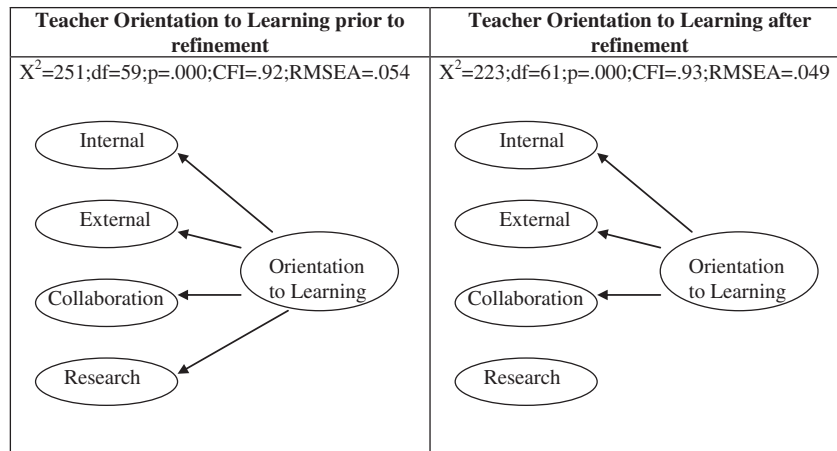


Fig. 5. Teacher orientation to learning measurement model refinement.

( $m = 3.08$ ) and even lower levels of practice ( $m = 2.88$ ) in collaborative professional learning. Teachers have the lowest levels of belief ( $m = 2.55$ ) and practice ( $m = 2.41$ ) related to the importance of research for professional learning possibly indicating some skepticism about its relevance and usefulness for teaching practice.

The differences between mean values and practices were significant for each construct (two-tailed  $t$ ). The effect size of these differences varied greatly. The effect size differences between values and practices for external orientation to learning were very small (Cohen's  $d = 0.081$ ). Effect size differences for internal orientation and collaborative orientation were small (Cohen's  $d = 0.195$  and  $0.280$ , respectively). While effect size for research orientation differences between values and practices were moderate (Cohen's  $d = 0.491$ ).

The differences in means between the practice elements and also between the beliefs elements of teachers' orientation to learning are also significant (see Table 3). As with differences between beliefs and practices of the same element, the effect sizes of the differences between elements vary. The effect sizes of differences between internal and external beliefs and practices are

small to moderate (Cohen's  $d$  for beliefs =  $0.479$ , practices =  $0.314$ ). Similarly, the effect size differences between collaboration and research beliefs and practices are moderate (Cohen's  $d$  for beliefs =  $0.655$ , practices =  $0.634$ ). All other effect size differences between elements (for both beliefs and practices) are large (See Table 3).

In reporting on change resulting from professional development practices, teachers perceived that their professional learning activities had the most impact on their teaching practice ( $m = 2.85$ ) and on their students ( $m = 2.42$ ). Teachers identified the fewest impacts on their teaching beliefs ( $m = 2.15$ ) indicating that their learning activities did not have a lot of impact on their beliefs about teaching, learning or how pupils learn. (See Table 4)

The difference in means between all the change model elements are significant (sig. =  $0.000$ , two-tailed  $t$ ). The effect sizes of these differences vary. The effect size for the difference between change in beliefs and change in students is moderate (Cohen's  $d = 0.430$ ) as is the effect size for difference between change in beliefs and change in practices (Cohen's  $d = 0.459$ ). The effect size difference between change in practices and change in students is large (Cohen's  $d = 1.008$ ).<sup>2</sup>

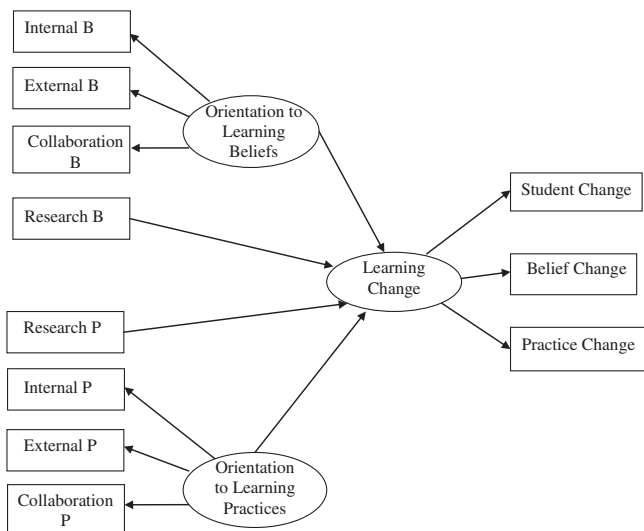


Fig. 6. Complete structural model of teachers' orientation to learning influence on learning change.

4.2. Measurement modeling: results

Using SEM procedures and fit statistics we concluded that our theorised elements of teacher professional learning are 'good' constructs given our teacher survey data (See Table 5). The models for teacher orientation to learning and learning change were statistically significant ( $p = 0.000$ ) and had CFI above 0.90. Additionally, most of these measurement models had RMSEA in the good range with only Teacher Learning Change in the adequate range. The RMSEA for this measure indicates that improvement could be made in this construct in future models of teacher learning

<sup>2</sup> A correlation table for all the measures to be used in the models is provided in Appendix A of this paper. Establishing the correlations between these measures is important in understanding the power of our modeling analysis. Generally, the lower the correlations between measures in the model, the easier it is to find 'good fit'. As correlations between measures increase, structural equation modeling has more power to detect whether the hypothesised models are incorrect. Our model involves 56 correlations between measures. Of these, all were significant at  $p = 0.001$  or better. Of these correlations between our measures, 10% would be considered strong correlations (greater than 0.50), 70% would be considered moderate correlations (between 0.20 and 0.5), and 20% would be considered weak correlations (below 0.20).

**Table 2**  
Means, standard deviations, significance of difference, and effect size for teachers' orientation to learning.

Teacher orientation to learning model	Beliefs		Practices		Difference	
	Mean	SD	Mean	SD	<i>t</i> sig. =	Cohen's <i>d</i>
Internal orientation to learning	3.38	1.877	3.32	2.197	0.000	0.195
I modify my practice in the light of evidence from self-evaluations of my classroom practice.	3.41	0.57	3.42	0.61		
I experiment with my practice as a conscious strategy for improving classroom teaching and learning.	3.39	0.54	3.38	0.61		
I consult pupils about how they learn most effectively.	3.33	0.61	3.07	0.70		
I reflect on my practice as a way of identifying professional learning needs.	3.39	0.56	3.42	0.57		
External orientation to learning	3.23	1.608	3.08	1.989	0.000	0.081
I use the web as one source of useful ideas for improving my practice.	3.11	0.57	3.30	0.69		
I draw on good practice from other schools as a means to further my own professional development.	3.03	0.56	2.82	0.75		
I modify my practice in the light of feedback about classroom practice from managers or other colleagues.	3.36	0.59	3.45	0.63		
Research orientation	2.55	2.688	2.41	2.870	0.000	0.280
I read research reports as one source of useful ideas for improving my practice.	2.59	0.67	2.41	0.74		
I relate what works in my own practice to research findings.	2.48	0.67	2.39	0.77		
I modify my practice in light of published research evidence.	2.57	0.63	2.42	0.70		
Collaborative orientation	3.08	2.053	2.88	2.579	0.000	0.491
I carryout joint research/evaluation with one or more colleagues as a way of improving my practice.	2.75	0.69	2.34	0.89		
I engage in reflective discussions of working practices with one or more colleagues.	3.33	0.58	3.34	0.65		
I engage in collaborative teaching and planning as a way of improving practice.	3.16	0.62	2.95	0.85		

change. However, Leithwood and Jantzi (2006), in a national survey of teachers in England, reported RMSEA for their models of transformational leadership between 0.07 and 0.09 and concluded that their models had good fit. Since our measurement models for teacher orientations and learning change have better fit than these measurement models with a similar sample of teachers, we believe at this stage that the fit statistics for these measurement models provide enough evidence that our hypothesised constructs were present in the data to continue with testing of the structure of influence in teacher professional learning.

#### 4.3. Modeling the relationship between the teacher orientation to professional learning and teacher learning change: results

There are two questions we must address: does our hypothesis that teacher orientation to learning affects teacher learning change fit the data from teachers? If so, to what extent is teacher learning change affected by teacher orientation to learning? To

**Table 3**  
Significance of difference and effect size for teachers' orientation to learning elements.

Teacher orientation to learning model	Differences between beliefs elements		Differences between practices elements	
	Sig	Cohen's <i>d</i>	Sig	Cohen's <i>d</i>
Internal and external	0.000	0.479	0.000	0.314
Internal and collaboration	0.000	1.722	0.000	1.673
Internal and research	0.000	1.701	0.000	1.767
External and collaboration	0.000	1.089	0.000	1.179
External and research	0.000	1.323	0.000	1.442
Collaboration and research	0.000	0.655	0.000	0.634

answer these questions we conducted a path analysis in Amos between our teacher learning orientation and teacher learning change (See Fig. 6 above for an illustration of the path structure). The path analysis function utilizes OLS regression to establish whether a connection exists between the various measurement models. Because of the complexity and number of measurement models present in our hypothesised model of teacher professional learning, we present the model fit for each of these paths

**Table 4**  
Means and standard deviations for change in teacher learning.

Change model	Mean	SD
Change in teaching beliefs	2.15	1.978
Changed the way I think about teaching and learning	2.46	0.81
Changed my beliefs about teaching	1.91	0.73
Changed my beliefs about pupil learning	2.07	0.75
Change in teaching practice	2.85	1.288
Improved my knowledge and skills	2.96	0.72
Prompted me to use new curriculum materials	2.73	0.82
Change in students	2.42	1.805
Improved pupil performance/outcomes	2.67	0.73
Changed pupil learning practices	2.61	0.75
Changed pupil behavior	1.99	0.73

**Table 5**  
Measurement models with indices of fit.

Measurement Models	$\chi^2$	df	<i>p</i>	CFI	RMSEA	$\alpha$
Teacher learning orientation practices	223.4	61	0.000	0.930	0.049	0.78
Teacher learning orientation beliefs	253.5	61	0.000	0.929	0.053	0.76
Learning change	156.7	17	0.000	0.957	0.086	0.83



**Table 6**  
Structural models with indices of fit.

Structural models	$\chi^2$	df	<i>p</i>	CFI	RMSEA
Teacher learning orientation <i>practices</i> effects teacher learning change	548.7	180	0.000	0.936	0.043
Teacher learning orientation <i>beliefs</i> effects teacher learning change	542	180	0.000	0.940	0.042

**Table 7**  
% Variance explained by path analysis: teacher orientation to learning beliefs, practices and change.

Effects	Teacher orientation to learning practices		Teacher orientation to learning beliefs	
	Internal, external & collaborative orientation	Research orientation	Internal, external & collaborative orientation	Research orientation
Teacher learning Change	0.45	0.04	0.33	0.14

separately in Table 6. As with the measurement model analysis presented in the previous section, CFI and RMSEA are reported to indicate whether the hypothesised path in the structural model fits the data.

All of the structural paths in our model of teacher learning orientation have good model fit. In all cases, the CFI is above 0.90 and the RMSEA is below 0.05. Thus, we conclude that these hypothesised elements of teacher orientation to learning are present in our teacher data. Teacher orientations to learning (including both their beliefs and practices about learning) have an impact on their learning change.

The strength of the effect of these paths varies in the model. Table 7 presents the % variance explained between teacher beliefs, practices, and teacher learning change.

A teacher's learning orientation practices (0.45) and learning orientation beliefs (0.33) have a moderate relationship to teacher learning change (See Table 7). Given our earlier exploratory analysis of these variables, it is not unexpected to find that a teacher's research orientation has little impact on their learning. It is interesting to note that beliefs about research have a stronger impact on teacher learning (0.14) than do research related learning practices (0.04).

## 5. Discussion

The results of testing our model support our argument that teacher learning is a dynamic process and we cannot understand learning by separating features of activities from individual teachers' orientations to learning. This stands in contrast to the more popular linear notions of teacher learning where participation in a learning activity leads to change in belief, change in practice and then change in student learning (Desimone, 2009; Guskey, 2002). Whether or not a teacher learns and then engages in a form of professional change is influenced by their beliefs, practices and experiential context. However, given the cross-sectional nature of our data, the role of context and experience remains unexplored. The theorised role of context and experiences specific to teachers and time, and how changes in circumstance would impact both orientations to learning and teacher change would require a longitudinal study. Further, the conceptualisation of teacher change as a singular event (change in belief or change in practice or change in students) has likewise been shown in our model to be incorrect in that the changes that teachers undergo are reciprocal. Thus, our work has implications both for the international research on teacher professional

development and also for those interested in teacher beliefs, practices, and change.

Whether teachers need to experience belief or practice change first as a result of professional learning has long been disputed and unclear. Our findings support a notion of teacher change that does not see change as a sequential process. Likewise, the relationship between teacher beliefs and teacher practices are similarly entangled. Assuming that belief change leads to practice change or that practice change leads to belief change may not be helpful in understanding the complex processes at work. Our measurement model, while having only moderate fit, provides evidence to support Huberman's (1995) assertion that the changes that teachers undergo are related and interrelated. When studies of teacher professional development and teacher learning focus on a singular measure of change – belief or practice or change in students – they fail to measure essential elements of the process that are entangled in teachers learning.

While our measure of change assumes the interrelation between belief, practice and student change in teacher learning, the measures we used could be improved upon in future research. Our measures asked teachers to reflect generally on the learning activities in which they had participated in the previous 12 months and then answer questions about the impact of these activities on their beliefs, classroom practices and students. Future measures of teacher learning change should tie specific activities to specific changes and this may lead to improvement in the measurement model fit.

This paper illustrates that teachers' orientations to learning impact what and how they learn. Beyond individual influences, teachers' learning is also influenced by organisational conditions. What we report here is only one part of a complex process that teachers experience while learning. Until we understand how characteristics of individual teachers and their schools interact to enhance and constrain professional learning, we will be unable to explain how professional development can be made more effective.

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## Appendix A. Relationships between variables in models tested

		Teacher orientation to learning								Learning change			
		Internal orientation		External orientation		Collaborative orientation		Research orientation		Practice change	Belief change	Student change	
		P	B	P	B	P	B	P	B				
Teacher orientation to learning	Internal orientation	P	1.00	0.601**	0.413**	0.286**	0.389**	0.291**	0.380**	0.265**	0.146**	0.155**	0.250**
		B		1.00	0.289**	0.457**	0.253**	0.424**	0.288**	0.395**	0.168**	0.160**	0.199**
	External orientation	P			1.00	0.593**	0.323**	0.265**	0.334**	0.269**	0.224**	0.215**	0.224**
		B				1.00	0.185**	0.365**	0.250**	0.382**	0.231**	0.177**	0.216**
Learning change	Collaborative orientation	P				1.00	0.615**	0.318**	0.208**	0.199**	0.188**	0.241**	
		B					1.00	0.263**	0.355**	0.224**	0.221**	0.211**	
	Research orientation	P						1.00	0.710**	0.176**	0.197**	0.187**	
		B							1.00	0.189**	0.232**	0.182**	
	Practice change									1.00	0.458**	0.466**	
	Belief change										1.00	0.484**	
	Student change											1.00	

\*\* $p \leq 0.001$ .

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