Teacher cognition: examining teachers' mental lives in language education

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Abstract

This paper reviews the literature pertaining to the field of teacher cognition, which investigates the mental constructs and the practices of teachers, with a particular focus on teachers of foreign and second languages. Given the wide uptake of teacher cognition as a framework for researching teachers, this review is meant to provide a starting point for researchers to take account of the evolution of the field and its future directions. As is evident from this review, what was initially substantially a cognitively-oriented endeavour, aiming to understand what teachers held in their minds, has now morphed into research that is essentially sociocultural in nature, viewing teachers' cognitions and practices as complex and embedded in context. This paper thus analyses research investigating the fundamental constructs of beliefs and knowledge and discusses certain limitations of such research, while examining the field's main emerging and promising themes of teacher identity and emotions.

Il presente articolo esamina la letteratura relativa al campo denominato "teacher cognition", che studia i costrutti mentali e le pratiche dei docenti, con un focus particolare sui docenti di lingue straniere e seconde lingue. Alla luce della grande diffusione di tale framework nelle ricerche sui docenti, questo articolo vuole fornire ai ricercatori un punto di partenza per

prendere in esame l'evoluzione e le direzioni future di questo campo. Come risulta evidente da questa analisi, quello che era una inizialmente un tipo di ricerca di orientamento sostanzialmente cognitivo, atto quindi a comprendere che cosa risiedeva nelle menti dei docenti, è ora diventato di natura essenzialmente socioculturale, con una concezione delle cognizioni e delle pratiche dei docenti come complesse e integrate nei relativi contesti. L'articolo analizza dunque vari studi basati sui costrutti fondamentali delle credenze (*beliefs*) e della conoscenza (*knowledge*), illustrando certe limitazioni di tali ricerche ed esaminando i principali e promettenti temi emergenti dell'identità e delle emozioni del docente.

Keywords: teacher cognition, teacher beliefs, teacher knowledge, language education, sociocultural theory.

Parole chiave: cognizioni, credenze, conoscenze docenti, educazione linguistica, teoria socioculturale

Introduction

Teacher cognition, the study of the "unobservable cognitive dimension of teaching – what teachers know, believe, and think" (Simon Borg, 2003, p. 81) has been an established field of research in education for the past forty years. The present review is aimed at providing an overview of the literature of this field through the analysis of its evolution, terminology, challenges and future directions.
Two aspects are prominent throughout this work: the variety of terminology that characterises this field and the challenges presented by the evolution of teacher cognition research throughout time. One fundamentally problematic aspect of teacher cognition research is in fact of a terminological nature: a number of different definitions have been presented in the literature regarding teacher cognition and the constructs of teachers' mental lives. Multiple terms have been

used to indicate a construct, while the same construct has been defined in different manners (Simon Borg, 2006). Although the proliferation of terms may have been necessary in what was once an emerging line of research (Simon Borg, 2003), some have advocated for the adoption of shared definitions (Russell Cross, 2010). Throughout this paper, the main terms used in the literature (most notably, *beliefs* and *knowledge*) are therefore discussed.

With regards to the evolution of the field, the scope of teacher cognition research has undergone a number of changes throughout time, evolving from initial process-product approaches into a cognitive, and later sociocultural, perspective in line with the "social turn" (Block, 2003) in applied linguistics. These changes have presented challenges to the way in which teacher cognition has been conceptualised and investigated. These challenges will therefore be discussed and an overview of present and future directions of the field will be given. The purpose of this review is therefore twofold. First, it is aimed at examining the underpinnings of the several existing definitions for the key concepts in the field, which ought to be successfully operationalised in the elicitation of empirical data. This criticality is meant to be especially useful considering the wide uptake of teacher cognition as a framework for both Master's and PhD research. Secondly, a thorough analysis of the lines of research in the field of language teacher cognition is meant to form the basis for critically engaging with future directions if the field is to progress further; hence, this review is meant to serve as an initial guide to provide direction to those, especially early career researchers, interested in pursuing this line of research.

Cognitive research: key terminology

The cognitive view of teachers stemmed from a reaction to behaviourism and was initially concerned with psychological

dimensions of teaching, namely information processing and decision-making, trying to identify the psychological processes underlying how teachers make interactive decisions in the classroom (Simon Borg, 2006). The thoughts, beliefs and decisions of individual teachers therefore became the unit of analysis (Burns et al., 2015).

In the 1980s, this concern with decision-making was criticised for only providing partial understanding of how teachers make sense of their work, with a claim that more complex and comprehensive models were needed (Mitchell & Marland, 1989). A wide array of concepts and terms therefore emerged which enriched the study of teacher cognition: *beliefs, knowledge, attitudes, perspectives, images, theories, assumptions* and *principles* are only some of the many terms which have attempted to describe teachers' mental lives. *Beliefs* and *knowledge* were, and still are, among the main concepts of reference in the field and are therefore prioritised in the present analysis.

Beliefs and knowledge

Beliefs and knowledge have been defined in several different ways. The identification of a clear cut distinction between the two has been described as a "daunting undertaking" at the very least (Pajares, 1992, p. 309). Because teachers' beliefs and knowledge are not held or perceived as separate in the mind, it has been arduous to pinpoint where one ends and the other one begins, especially when these two constructs have to be operationalised in empirical research (Simon Borg, 2006).

An overview of the terminological discussions on these two terms reveals certain specific recurring distinctions: primarily, knowledge is regarded as "objective", universal and impersonal while beliefs as "subjective", idiosyncratic and personal (D. Woods & Cakir, 2011). It would be reasonable to argue that from a philosophical standpoint, a positivistic view

of the truth as "objective" is rather limited, as "a proposition can never be "proven" to be true, it can only be refuted. Many assumed "truths" or "universals" are later determined to be culture- or context-specific". In practice, therefore, the objectivity of a proposition is a matter of demonstrability and consensus" (D. Woods & Cakir, 2011, p. 383). As a matter of fact, some scholars have argued that finding a distinction may not even be desirable or necessary: Lewis (1990) maintained that all knowledge is, on reflection, the product of an evaluative judgement, hence the two terms should be used as synonyms. Similarly, Kagan (1990) claimed that the two terms should be used interchangeably because much of a teacher's knowledge is in fact defined subjectively and Alexander, Schallert, and Hare (1991) defined knowledge as encompassing all that a person knows or believes to be true.

Nevertheless, other scholars have attempted to distinguish between knowledge and beliefs. One of the most widespread distinctions is that unlike beliefs, knowledge has epistemic warrant - that is, sufficient evidence exists to justify the claim that something is in fact knowledge (Richardson, 1996). Another useful observation is that beliefs do not require general or group consensus; furthermore, they appear as more inflexible and evaluative, while knowledge is more open to critical re-examination (Nespor, 1987). Fenstermacher (1994) has distinguished two separate uses of the term knowledge: one to indicate knowledge that has epistemic warrant, and another as a "grouping" term, including a variety of ideas, conceptions and perspectives generated by teachers without any claim as to their epistemic warrant. In other conceptualisations, knowledge been placed on a continuum: this is the case of the BAK (beliefs-assumptions-knowledge) model elaborated by Devon Woods (1996). He maintained that teachers make use of their beliefs and knowledge in a dynamic and evolving fashion that does not allow for a clear distinction between the two at any given time. He therefore placed them on a spectrum according to the extent to which a teacher regards an idea as widely shared as opposed to personally

held, and to which a teacher identifies or holds a moral judgement on it (D. Woods & Cakir, 2011).
In light of the above debate, it is evident that identifying a distinction that allows the researcher to successfully elicit and categorise data from teachers is far from being a simple endeavour. Nevertheless, I propose that a position that can best operationalise these two constructs for elicitation and analysis views knowledge as possessing features of objectivity and impersonality (e.g. propositional knowledge of language and syllabi) and teacher beliefs as propositions that the individual personally regards as true. In this sense, beliefs have an evaluative, affective and episodic nature which sets them apart from propositional knowledge, as is illustrated below.

Beliefs

Since Munby's (1982) call for teacher cognition to embrace the study of beliefs, this construct has been the subject of much investigation. This section will focus on a definition for teacher beliefs, beliefs' origins, relationship with teaching practice and changes over time.
Firstly, as pointed out by Pajares (1992), in research, it is normally not general teachers' beliefs about any aspects of life that are investigated, but *educational beliefs about* different aspects of teaching. He claimed that beliefs are "an individual's judgement of the truth or falsity of a proposition, a judgement which can only be inferred from a collective understanding of what human beings say, intend and do" (Pajares, 1992, p. 316). Similarly, Woods defined beliefs as the "acceptance of a proposition for which there is no conventional knowledge, one that is not demonstrable and for which there is accepted disagreement" (1996, p. 195). These two definitions provide a useful distinction from knowledge. In short, a belief can therefore be defined as "a proposition which may be consciously or unconsciously held, is evaluative

in that it is accepted as true by the individual, and is therefore imbued with emotive commitment; further, it serves as a guide to thought and behaviour" (M. Borg, 2001, p. 1).

Beliefs are considered stronger predictors of behaviour than knowledge is (Nespor, 1987), and those acquired early in life are less vulnerable to change even against contradictions caused by reason (Pajares, 1992). Consequently, research has focussed on where beliefs originate and to what extent teacher education programmes can have an impact on teacher beliefs and practice, since such programmes are likely to occur in the adulthood of teachers' lives (Burri, Chen, & Baker, 2017).

Educational beliefs originate, among others, from sources such as personal experiences, schooling, teacher education and teaching experience. In terms of personal experiences and schooling, the most notable effect is perhaps the fact that teachers arrive in teacher education programmes with more or less conscious beliefs, derived from observing teachers in action for many years as learners. This phenomenon, termed *apprenticeship of observation* by Lortie (1975) is likely to influence their teaching practice throughout their lives (M. Borg, 2004). Evidence of this is found in a number of studies: for example, Johnson (1994) discovered that the beliefs of the pre-service teachers involved in her study were highly influenced by the images formed in their years of language learning. This was true even though the teachers were conscious of the inadequacy of such images, which also conflicted with their self-perceived identities as teachers. More recently, Moodie's (2016) study on Korean in-service teachers' conceptions of English Language Teaching found near consensus that prior language learning experiences deemed negative by the participants served as models of what not to do in the classroom, which the researcher describes as an "anti-apprenticeship of observation" (Moodie, 2016, p. 29).

This long-lasting effect of pre-existing beliefs in pre-service teachers has caused some to question the actual effectiveness of teacher education programmes (Richardson, 1996), as

these beliefs function in fact as filters through which the input from the programmes is processed. It is now therefore generally acknowledged that teacher education programmes are more likely to affect student-teachers' practices if they also have an impact on their beliefs (Simon Borg, 2011). However, the extent to which these programmes can change beliefs is debated, as some studies have yielded positive results (Cabaroglu & Roberts, 2000; Farrell, 2009), while others have reported no substantial modifications in student-teachers' beliefs pre- and post-course (Peacock, 2001; Urmston, 2003). An important distinction in this sense is to be made between cognitive change and behavioural change: teachers might modify their teaching behaviours without changing their beliefs, and vice versa (Simon Borg, 2006).

One final factor influencing beliefs is teaching experience, which is particularly relevant for in-service teachers. Studies have suggested that teachers' accumulated and personal experiences of what they perceive as successful in their classrooms informs their beliefs and greatly influences their classroom practices (Breen, Hird, Milton, Oliver, & Thwaite, 2001; G. Crookes & Arakaki, 1999).

The relationship between beliefs and classroom practice is understood to be interactive: beliefs influence action, but reflection on action can lead to a modification or addition in beliefs (Richardson, 1996). In language teacher cognition, Basturkmen's (2012) review of studies on teacher beliefs and practices suggests that stated beliefs and practice correspond mainly when they are concerned with planned aspects of teaching or experienced teachers, though caution should be used when evaluating this conclusion given the predominantly doctoral nature of the studies included in the review.

In this regard, an issue should be problematised that has perhaps been oversimplified, resting on the questionable but widespread assumption that it is desirable for beliefs to coincide with practice (Kubanyiova & Feryok, 2015), when the two can actually coincide even in the case of poor practice. Furthermore, there has been a tendency in language teacher

cognition studies to elicit teacher beliefs (often by means of self-report instruments), detect mismatches with observed practice and attempt to identify reasons why teachers may not teach according to their beliefs. It is arguably not a coincidence that in these studies, beliefs are often regarded as being in line with shared pedagogical recommendations while practice is more "problematic": beliefs elicited via questionnaires will likely only reveal theoretical and socially acceptable teacher beliefs, and hence to diverge with practice. Further, findings of inconsistencies can be explained with reference to contextual factors (such as syllabi or time constraints), the co-existence of contrasting core and peripheral beliefs, held with more or less conviction (Phipps & Borg, 2009), or a lack of shared understanding, by the researcher and the teacher participants, of the terms used to describe beliefs and practices, as suggested by Speer (2005) and exemplified by Graham, Santos, and Francis-Brophy (2014). In their survey of language teachers, the mismatch between the stated importance of teaching learners how to listen effectively and the lack of consistent stated practices was explained by considering that "listening effectively" may have meant "successfully completing a task" to the participants. Finally, as argued by Simon Borg (2018), most studies fail to discuss whether they investigate professed beliefs (what teachers say they believe) or attributed beliefs (their beliefs as inferred from their practice). This is not an uncontentious distinction, and I argue that most studies are based on beliefs that are both professed (reported by teachers in interviews, questionnaires, think-aloud) and enacted, as "researchers make various attributions to teachers through choices about data collection, theory, analysis of data, and presentation of findings" (Speer, 2005, p. 361).

Knowledge

Although knowledge might be hard to distinguish from beliefs in empirical research, epistemologically it can be defined as being "closer to the truth" (referred to generally accepted

facts) than to opinions (Zheng, 2015). Kubanyiova and Feryok (2015) claim that cognitive research has developed two perspectives on knowledge. One, informed by the work of Gage (1978), among others, regarded knowledge as abstract, propositional and nomothetic; the other one considered it subjective, experiential and situated. The latter fostered a tradition that challenges positivistic views of knowledge and the separation of science and knowledge, and objectivity and subjectivity (P. Golombek, 2009).

In this framework, two concepts emerged which are still prominent in the literature: *practical knowledge* and *pedagogical content knowledge*. Many other categorisations of knowledge have been elaborated, though they will not be examined in this work for reasons of space.

Elbaz's (1981) concept of practical knowledge focusses on the type of tacit knowledge that is acquired in action as a response to a teaching situation (Winkler, 2001). It "encompasses first-hand experience of students' learning styles, interests, needs, strengths and difficulties, and a repertoire of instructional techniques and classroom management skills" (Elbaz, 1983, p. 5). This highly experiential, personal, intuitive and tacit type of knowledge is implicitly informed by theoretical knowledge and merges theory and practice in a reciprocal relationship (Hüttner, 2012). Connelly and Clandinin (1990) re-elaborated this concept as *personal practical knowledge* by framing practical knowledge as embodied in teachers' narratives, thus conceptualising teaching not as informed by theory, but as the "unification of theory and practice through what they referred to as the narrative unities of the experience of the teacher" (Hüttner, 2012, p. 19). Shulman (1986a) lamented that research had neglected subject matter knowledge and how it is transformed into the content of instruction. He introduced the concept of pedagogical content knowledge (PCK) – as one of seven types of knowledge – and defined it as the transformation of subject matter knowledge into forms that are teachable and accessible to learners. PCK is subject-

specific and it is recognised as the type of knowledge that is the most central to successful teaching (Hüttner, 2012).

Teacher knowledge has been widely explored especially in science and mathematics education (Evens, Elen, & Depaepe, 2016). In the field of language teaching, however, the study of knowledge has been more limited (Tsui, 2011) and framed mostly in terms of the knowledge base of teaching, needed as the basis to structure successful teacher education programmes. This reluctance to investigate the concept of knowledge in language teaching can be ascribed, among other reasons, to the fact that distinguishing between the traditional categories of declarative knowledge (knowing "about") and procedural knowledge (knowing "how") is hard in language education: the target language in a classroom represents in fact the content of the teaching, but it is also involved in its delivery, when the language is used as the instructional medium (Devon Woods, 1996). In this sense, language is different from other subject matters.

Despite this difficulty, knowledge has been explored in the field of language teacher education with the purpose of designing effective teacher education programmes. As Burns and Richards (2009) point out, understanding the relationship between knowing about and knowing how is of the utmost importance to teacher education. They argue that in the past, it was generally assumed that providing student-teachers with knowledge about language and about methodology would suffice for the two to inform classroom practice; however, research has suggested that this might not be in fact the case and that teachers might struggle to apply these knowledges in practice (Bartels, 2009).

Different models outlining components of language teacher knowledge have been proposed in the literature – notably Day (1991); Freeman and Johnson (1998); Richards (1998); Roberts (1998) – with some of the components overlapping significantly across different models. The overarching distinction between declarative and procedural knowledge is therefore a useful starting point to detect commonalities

across these models. Overall, declarative knowledge in language teaching is intended as propositional and normally related to content. On a basic level, content knowledge consists of knowledge of the target language; however, Wright and Bolitho (1997) have refined this aspect, arguing that possessing content knowledge entails being both a proficient user and a skilled analyst of the language. Both these components have however more recently been further problematised in light of the development of English as a Lingua Franca and the extent to which teachers really manage to apply their knowledge about language (including aspects of supporting subject areas such as discourse analysis, second language acquisition or language testing) in practice. Additional components of declarative knowledge have been identified by different authors, including intercultural competence (Liddicoat, 2006), aims of language teaching and teaching context (Ochieng'Ong'ondo, 2017).

Procedural knowledge in language teaching is conceived as the practical enactment of content in the classroom. Pedagogical content knowledge is a clear example of this type of knowledge. In language teaching, the majority of authors who have examined this construct have done so with reference to Shulman's (1986b) framework (Evens et al., 2016). There does not appear to be a consensus on its components and definition, as some have equated it to knowledge of methodology, while others have intended it as encompassing knowledge of language learning, methods, testing and skills (Day, 1991). PCK has therefore proven to be a controversial construct in language teaching, to the extent that whether it can successfully be investigated has been called into question (Freeman, 2002). This is linked to the fact that significant evidence suggests that language teaching is a unique endeavour, distinct from other subjects due to its defining inseparability of content and medium (König et al., 2017).

However, recently there has been renewed interest in the concept thanks to Mishra and Koehler's (2006) elaboration of

Technological Pedagogical Content Knowledge. This construct comprises the knowledge and use of content, pedagogy, and technology and an increasing amount of research has focussed on its implications for language teachers, such as Cheng (2017); Tseng (2016).

This section has explored the concepts of practical and pedagogical content knowledge in general educational research and more specifically in language teaching, despite the difficulties in defining types of knowledge in the latter field in particular. The affirmation of a concept of knowledge as practical and experiential, and no longer only propositional and held in the mind, exemplifies the expansion of the unit of analysis in language teacher cognition, with a view of teachers and their knowledge as socially situated and mediated in contexts.

The evolution of teacher cognition research

Teacher cognition research is concerned with the study of teachers' mental lives and how these relate to teaching practice and to student learning. The ways in which cognition has been conceptualised have changed considerably with time, with influences from the fields of psychology and mainstream educational research especially. Since the mid-1990s, this field has developed in the field of language teaching, which will be the focus of this review.

In the 1960s and 1970s, the main paradigm was a process-product approach, which studied teachers in terms of what they did in the classroom (the process) and how this affected learning outcomes (Freeman, 1996). In line with theories of behaviourist psychology, which regarded learning as a matter of habit formation, teaching was conceived as observable behaviour and framed in terms of how different teacher behaviours would lead to different learning outcomes. In language education in particular, according to Burns et al. (2015), this coincided with the development of the Direct and Audiolingual methods, aimed at automatising learners' responses and behaviours, which in turn led to a view of

teaching as automatic, with tasks such as drills demanding very little thought on the teacher's part. While both the process-product approach in teacher cognition and the Direct and Audiolingual methods in language teaching drew on behaviourism and developed simultaneously, caution should be used in claiming the existence of a direct correlation between them. Furthermore, the assumption that the Direct and Audiolingual methods required almost no thought from teachers is rather categorical and a more nuanced view, accounting for some degree of decision-making and classroom management skills, would perhaps be more appropriate.

Starting from the 1960s, behaviourist theories of psychology began to be heavily criticised. The crucial role of thinking in shaping behaviour was acknowledged; as a result, teachers were no longer regarded as passive enactors of external prescriptions, but as active decision-makers in the classroom, with their behaviours re-conceptualised as *thoughtful* behaviours. Early research in the 1970s and 1980s focussed on what was called *teacher thinking* and mainly investigated problem-solving, decision-making and teacher judgement. Teaching as information processing was a metaphor that dominated this early research, which was more associated with research in psychology rather than education (Simon Borg, 2006). Again, Burns, Freeman and Edwards (2015) point out how this shift in perspectives coincided with a change in methodologies in language teaching: in the 1980s, a number of innovative teaching methods were elaborated, such as Suggestopedia, the Silent Way, Community Language Learning and the Natural Approach. It has been argued that if a teacher chose and implemented one of these methods, then naturally some cognitive capacity must have been involved in making such a decision (Freeman, 2007). This stance is, however, somehow problematic, as teachers may have had a number of "external" reasons for adopting any given method (e.g. it may have been imposed on them by their school or they may have been taught according to one method in a pre-service education programme). It would be legitimate to

wonder whether the cognitive capacity of a teacher might not be more important when selecting techniques and principles from different methodologies, in a form of principled eclecticism.

The shift to a cognitive perspective on teacher cognition paved the way for what has perhaps been its most prolific strand of research, drawing extensively on cognitive psychology and leading to the definition of constructs such as *beliefs* and *knowledge* as guiding teachers' actions. This fundamental strand of research, which has more recently been defined as cognitivist and individualistic (Kubanyiova & Feryok, 2015), is explored in a later section in relation to the main challenges presented by its concepts, terminology and critiques.

The cognitive orientation extended its scope by progressively acknowledging the role of social context in teacher cognition. Thanks to the social turn in applied linguistics, prompted by the development of sociocultural thinking and social constructivism, learning began to be conceived as inseparable from its social context, and all cognitive functions were regarded as a product of social interaction (Vygotsky & Cole, 1978). With cognitive psychology evolving and prompting a sociocognitive understanding of learning, teachers came to be viewed as social beings whose inner lives were situated "within teachers' larger lives and within larger environments, most pertinently their classrooms, which exist in schools in larger systems (such as local and national educational systems), but also their larger lives and the social, cultural, and historical environments in which they occur" (Kubanyiova & Feryok, 2015, p. 440).

This section has briefly reviewed the evolution of teacher cognition. After touching upon the early research on teacher thinking and a process-product approach, it examined the cognitive view of teachers as active decision-makers and subsequently as socially situated in contexts.

Limitations of cognitive research

As previously mentioned, research on language teacher cognition progressively found that a positivistic and individualistic paradigm was insufficient to explain the complexities of teachers' mental lives. In line with a more general social turn in applied linguistics, prompted by the development of sociocultural theory, teacher cognition research experienced a paradigm shift. Its epistemological stance was rooted in a view of human learning as a dynamic social activity situated in contexts (Karen E. Johnson, 2006). Learning was then no longer an isolated, internal psychological process, but the process of becoming a member of a *community of practice* through social participation (Burri et al., 2017).

The form of analysis shifted from quantitative accounts to qualitative interpretation, introducing a stronger sense of reflexivity on how the research event itself influences the teachers' sense making, with "a move from researcher-determined decisions and beliefs about language teacher thinking to participant-oriented conceptualizations and explanations" (Burns et al., 2015, p. 591). The potential of sociocultural theory in teacher cognition research is well explained by Cross (2010), who proposes its adoption as a unifying framework, as it allows examination of what teachers think, know and do as both historical and sociological agents in wider contexts, while better understanding the "tensions" arising from contradictions between thought and action. It should also be noted that in the 1990s and 2000s, this sociocultural perspective was further elaborated to include a wider temporal dimension of history: in this *sociohistorical* framework, learning and teaching were no longer viewed only in relation to their context meant as the current lesson in the current classroom, but to a host of diachronic factors, such as the social history of the school and classroom or the backgrounds of the teachers (Burns et al., 2015).

This "considerable stretch towards the social end of cognition" (Crookes, 2015, p. 495) has much in common with the work of some scholars who have highlighted the limitations of a purely cognitive approach. Some object to its results, claiming that still too little is known about how cognitions relate to student learning (Kubanyiova & Feryok, 2015) and about the impact of teacher education programmes on the development of teacher cognitions (Burri et al., 2017). Furthermore, Kubanyiova and Feryok (2015) maintain that the widely investigated relationship between teacher cognitions and practice has been abstracted from the context, while it should be viewed as situated and rooted in context. Contradictions between stated beliefs and practice are often viewed as undesirable, though it has been claimed that the recognition of such contradictions could instead serve as the basis for teacher development and growth (Golombek & Johnson, 2004).

Another group of critiques has more of an epistemological nature: notably, Kubanyiova and Feryok (2015) have claimed that the cognitivist paradigm investigates reified mental constructs (such as beliefs and knowledge) as static and discrete entities. This stance echoes earlier criticisms of the individualistic Anglo-American cognitive psychology, which conceptualised the mind as independent from the cultural context (Crookes, 2015). Such critiques argued against a purely cognitivist perspective and "subjectivist bias", claiming that human behaviour is dependent on more than just individualistic cognitive determinants such as beliefs and that more efforts ought to be devoted to the study of the environment that the mind is shaped to meet, rather than to hypothetical, static models of the mind (Sampson, 1981). Other criticisms are methodological, claiming that discourse analytic, narrative and ethnographical approaches would be suitable and innovative methods to capture teachers' mental lives more fully (Kubanyiova & Feryok, 2015). Despite explicitly recognising the contribution of cognitivist research in forming our current comprehension of teacher cognition,

this methodological stance seems to question the value of quantitative analyses (Simon Borg & Alshumaimeri, 2017).

Finally, several scholars have presented the need to further investigate the role of emotions and identity in shaping cognitions (Barcelos, 2015; Miller, 2009; Swain, 2013). As is explained later, emotions and identity have been included in a recent "expansion" of the scope of the field (S. Borg, 2012) and they deserve exploration in future research. It has also been argued that this expansion should be accompanied by a discussion of whether these "new" entities can actually theoretically co-exist within the same framework (Crookes, 2015).

Future directions

As the field of teacher cognition expands, some new dimensions appear to be central in potential future studies. In this review, the focus is in particular on the themes of emotions, identity and complex systems theory, which have been identified as three frequently cited directions for future research in recent literature.

Firstly, the role of emotions in teaching, that is, the affective dimension of teachers' lives, has not yet been satisfactorily investigated. While this may be due to an inheritance from the rationalist tradition of thinking, which viewed emotions as juxtaposed to cognition and detrimental to cognitive development, research over the past three decades has provided evidence of the central role of emotions in teachers' lives. Despite a lack of agreement on a definition for emotions and a tendency not to define them explicitly, much educational research has acknowledged that teaching is a highly emotionally challenging endeavour (Fried, Mansfield, & Dobozy, 2015) and has hence investigated themes such as the interrelationship between teacher and learner emotion (Sutton & Wheatley, 2003), and between emotions and teacher behaviour, concluding that teacher emotions do influence learner emotions and teacher behaviour. Furthermore, some

authors have attempted to assemble teacher emotion inventories (Chen, 2016).

In language teaching, work on teacher emotions stemmed from a number of criticisms to existing research, claiming, for instance, that emotions had been relegated to quantifiable affective factors or individual differences, dissociated from social contexts (Barcelos, 2015) and, specifically in teacher cognition, that they were "noticeably absent" (P. Golombek & Doran, 2014, p. 103) from Borg's (2003) definition of teacher cognition of "what language teachers think, know, believe and do" (p. 81). It should however be noted that, in response to what is clearly a theme emerging as crucial in current research, S. Borg (2012) claimed that emotions are naturally not excluded from teacher cognition because beliefs have an affective side to them and that neuroscience has acknowledged the role of emotions in shaping thinking.

In essence, the inseparable nature of cognition and emotion in language learning and teaching is interesting more and more scholars. Some recent work rooted in sociocultural theory, especially in second language teacher education, has already focussed on the pervasiveness of emotional content in teachers' cognitive development and on cognitive/emotional dissonance (the sense of instability caused by the discrepancy between teachers' envisioned scenarios and the reality of teaching) as a potential source for novice teachers learning (e.g. Golombek & Doran, 2014; Johnson & Worden, 2014). From a methodological standpoint, the very nature of emotions as related to teachers' personal stories makes narrative inquiry a suitable approach (Barkhuizen, 2016; Golombek & Johnson, 2004).

The second aspect which emerged as central in future research is related to teacher identity, that is, teachers' perception and understanding of themselves and of others as instructors of a second language (Murray & Christison, 2011). Drawing on multiple definitions, Miller (2009, p. 174) concludes that teacher identity is "relational, negotiated, constructed, enacted, transforming and transitional". Once

again connected to a sociocultural perspective, the emergence of teacher identity as a theme in teacher cognition research is motivated by a number of concerns which make it particularly relevant to language teaching. Among these, Varghese, Morgan, Johnston, and Johnson (2005) cite the marginalisation experienced by language teachers in and outside of schools, the position of non-native teachers of English (in terms of power, status and legitimacy), the variability of TESOL teachers' lives and knowledge in different areas of the world and the hierarchical teacher-student relation. Miller (2009) suggests four directions for future research that connect teacher identity to understanding, knowledge and practice: the nature of identity, the complexity of context, the need for critical reflection and identity in relation to transformative pedagogy. Furthermore, Barcelos (2015) makes a case for exploring the relationship between identity and beliefs and between identity and emotion.

One last aspect that may be further developed in future teacher cognition research is what Burns et al. (2015) have termed a "complex, chaotic systems ontology". The interest in complex and dynamic systems theory in applied linguistics since the 2000s has prompted scholars to identify its relevance to the field of language teacher cognition. As pointed out by Feryok (2010), language teacher cognitions appear to share features with complex systems, in that they are complex, dynamic, sensitive to initial conditions, contextualised, open and self-organising. As Burns et al. (2015) note, however, this approach does not seem to have been widely integrated in current research yet. It is plausible to argue that however intriguing this new strand of research might be, it will have to identity appropriate methods of inquiry if it is to establish itself in the field.

Conclusion

The present review has attempted to present the evolution of the field of language teacher cognition and highlighted the progressively more prominent role of the teacher as a social

being embedded in and inseparable from context. It is therefore hoped that future studies will illuminate language teachers' cognitions in connection with the emerging themes of teacher identity and teacher emotions and explore new and improved methodological developments.

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