Exploring L2 English Teachers' Investment in the Chinese Smart Classroom from a Socio-material Perspective

Wanying (Weeko) Zhong

MSc in Education (Applied Linguistics and Second Language Acquisition), 2024

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Wordcount: 19916

ACKNOWLEDGEMENT

I am deeply grateful to my supervisor, Dr Anna-Maria Ramezanzadeh, for her invaluable support and guidance. I would also like to extend my heartfelt thanks to my friend Tianxi and all the participants who generously gave their time to this research. My deepest gratitude goes to my parents, friends and partner for their unwavering support and encouragement throughout this journey. Finally, to myself, who has finished the work and the degree.

ABSTRACT

This study explores the language investment of L2 English teachers in Chinese smart classrooms. The guiding framework of the study – Norton's (2015) model of investment, which includes the constructs of identity, capital and ideology - is explored through a qualitative case study design. The study adopts a particular socio-material focus for the analysis of identity to capture the complex interactions between human and non-human elements in the process of identity construction. Data were collected from six L2 English teachers through the background questionnaire, diaries, classroom observation and the semi-structured interview.

The findings revealed the complex interplay between identity, capital and ideology and found that 1) the affordances and constraints of smart classrooms promote both positive and negative identity positioning. 2) Participants have conflicting attitudes towards viewing L1 as valuable linguistic capital and often leverage their existing capital for language investment. 3) Conflicting ideologies, informed by participants' cultural capitals and institutional constraints, further shape teachers' classroom practices. These findings suggest new directions for future research on language investment and provide pedagogical implications for educators and policymakers.

Keywords: language investment; identity; capital; ideology; second language English teachers

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CHAPTER 1: INTRODUCTION

In recent decades, globalisation has fostered increased transnational communication and trade, with English commonly serving as a medium of communication and gaining valorised status (Li, 2022). In line with this trend, China has experienced a significant increase in the demand for English learning and teaching, resulting in the formation of the world's largest English learning and speaking population (He & Zhang, 2010). This development has attracted considerable research attention to English acquisition in China.

Studies on second language (L2) English acquisition in China have explored a wide range of topics, from the linguistic aspects of language skills (e.g., reading, listening, speaking, and writing) to individual factors (e.g., motivation, learning strategies, and age) (Lu et al., 2022). These studies have predominantly focused on the cognitive and psychological approaches to second language acquisition (SLA). In the mid-1990s, however, these long-standing approaches were criticised for oversimplifying SLA as a universal pattern divorced from the complex environments in which learning occurs (Wu, 2017). This criticism led to a "social turn", which viewed SLA as a contextualised phenomenon mediated by dynamic social elements embedded in specific social contexts (Ortega, 2011). Following the paradigm shift, several socially oriented theories, such as sociocultural theory, academic discourse socialisation, and the concepts of identity and investment have been proposed to characterise SLA (e.g., Duff, 2010; Lantolf, 2000; Norton, 2000; Pennycook, 2017; Vygotsky, 1987). Among these, language investment has been proposed by Norton Peirce (1995) to uncover L2 speakers' L2 learning and/or teaching.

Language investment is a social counterpart to the psychological construct of "motivation", examining the conditions under which L2 speakers are committed to L2 learning and/or teaching (Darvin & Norton, 2016). By theorising the complex relationship between the L2 speakers and the social world through the concepts of "identity", "capital", and "ideology", language investment explores the dynamic power relations inherent in the language learning and/or teaching process. It addresses

how L2 speakers, influenced by factors such as social class and cultural heritage, are either granted or denied the right to speak (Darvin & Norton, 2015).

The rapidly evolving digital landscape, characterised by the growth of online tools, resources and communities, has directed many language investment research to virtual settings (e.g. social networking sites) (Han & Reinhardt, 2022). However, the classroom remains the most common site for L2 English learning (He & Zhang, 2010). In contemporary Chinese classrooms, the integration of technology has transformed traditional classrooms into dynamic, interactive learning environments, often referred to as "smart classrooms". It provides various technologies, hardware devices and educational management software to deliver language learning resources and encourage interaction and engagement in the classroom (Dai et al., 2023).

Despite this transformation, few studies have examined the agentic role of non-human entities in language investment research within smart classrooms. There is a renewed call to integrate the technical/material and the social to better understand the complex interactions between humans and non-humans and their co-construction of identity, a key construct of language investment (Faraj & Azad, 2012; Toohey, 2018c). Adopting an innovative socio-material perspective to operationalise identity, which goes beyond sociocultural and poststructural perspectives, can provide valuable theoretical insights into language investment research and offer pedagogical implications for the design of classroom materials, aspects that are often overlooked by other perspectives.

Furthermore, research on language investment has predominantly focused on L2 students (e.g., Jiang, 2018; Liu & Darvin, 2023; Norton, 2016b; Teng, 2019; Yuan, 2023), and in limited cases, first language (L1) teachers, possibly due to the perception of teachers as inherently more competent individuals in the classroom. However, research on language investment should also devote research attention to L2 teachers, who may have different investment compared to students and L1 teachers due to their identities as simultaneously more knowledgeable figures and perpetual L2 learners in the classroom (Chen & Goh, 2011; Kanno & Stuart, 2011).

This research therefore aims to examine L2 English teachers' language investment in the smart classroom. Drawing on Norton's (2015) model of investment, it explores how L2 teachers construct their identities, perceive and exercise their and students' capital, and how language ideologies drive and underpin their classroom practices. The power dynamics manifested in the process of investment are also explored. A qualitative case study is adopted with a particular socio-material focus on identity, reflecting both the poststructural underpinnings of the language investment model proposed by Norton (2014) and the growing call for a socio-material approach to identity.

The subsequent Literature Review section will thoroughly explain "investment" and its individual constructs and relate them to the Chinese context with reference to empirical evidence. The Methodology chapter outlines the philosophical positioning and the research design, and provides a detailed description of the research methods, including research instruments, procedures, and analysis. The chapter concludes with a discussion on research ethics and trustworthiness. The Findings and Discussion chapter presents the findings in response to the three research questions, addressing each in turn and relating them to the theoretical and empirical literature. The final chapter concludes the thesis with a summary of findings, an examination of strengths and limitations, areas for future research, and implications for English teaching in Chinese smart classrooms and beyond.

CHAPTER 2: LITERATURE REVIEW

This chapter offers a review of theoretical and empirical literature pertaining to the key concepts of this study. It begins by introducing the concept of "investment" and Norton's model of investment for operationalising investment. The chapter then explains the construct of the model - identity - with a particular focus on poststructural and socio-material perspectives, supported by empirical studies. It then introduces the remaining construct, capital and ideology, and relates them to the context of English language teaching in China. Following this, empirical research on the model of investment is presented. The chapter concludes with a discussion on current English teaching in Chinese smart classrooms and highlights the existing research gap in the study of language investment.

Investment

The development of investment research was driven by Norton Peirce's (1995) attempt to conceptualise the relationship between language learners and their social world, with the aim of uncovering learners' commitment to language learning from a social perspective. Prior to the development of investment, *commitment to learning* was usually understood as a product of learner motivation, an internal force that drives and sustains learners' efforts in language learning (Dörnyei & Otto, 1998). However, such a psychological construct could not explain situations in which learners are highly motivated to learn, but still resist speaking in unfavourable social contexts where they feel marginalised (Darvin & Norton, 2016; Duff, 2002).

In recognition of this limitation, *investment* has been theorised as a complementary sociological counterpart to L2 motivation research (Ushioda, 2020). It is defined as "a strong dynamic term with economic connotations … accentuates the role of human agency and identity in engaging with the task at hand, in accumulating economic and symbolic capital, in having stakes in the endeavor and in persevering in that endeavor. In the North American context, investment in SLA has become synonymous with 'language learning commitment' and is based on a learner's intentional choice and desire" (Kramsch, 2013, p. 195). However, for L2 teachers, investment could be interpreted as a commitment to teaching the language in addition

to learning it. This was found in Norton (2017), where she discussed teachers' commitment to teaching English in the African Storybook (ASb).

However, investment researchers have also recognised that investment is socially embedded, with shifts in the **"**conditions under which social interaction takes place and the extent to which power relations limit language learners' opportunities to speak" (Darvin & Norton, 2023, p. 20). To unpack these conditions, multiple constructs are implicated in this discussion, these being identity, capital, and ideology, which will each be defined and unpacked in the following section.

The poststructuralist perspective on identity suggests that identity is negotiated through social interaction and language. Learners need to assert their identity in order to invest in learning the target language (Darvin & Norton, 2023). At the same time, learners may invest in the target language in the hope of gaining more valuable capital. Furthermore, ideology explains the relationship between people's communicative practices and their systemic patterns of control, revealing how power is manifested in different contexts and influences the "subjectivities" or "positioning" of learners and their interlocutors (Darvin & Norton, 2015). These power dynamics can lead to tensions between agency and the social structure set by the field, learners' freedom or lack of choice, and the limitations of the choices available to learners, further explaining the conditions in which investment takes place (Darvin & Norton, 2023).

Overall, investment is an important consideration in current sociolinguistic and educational research. It provides researchers with a critical lens through which to unpack the dynamic power manifested in different contexts and how different conditions (identity, capital, and ideology) shape the commitment to language learning and teaching (Darvin & Norton, 2016).

Norton's Model of Investment

One of the most prominent models in current investment research is Norton's (2015) model of investment. It has undergone a number of refinements and advancements in response to the diversity and fluidity of the global landscape brought about by increased mobility and technological advances (Darvin & Norton, 2015).

The model currently involves the constructs of identity, capital, and ideology, which will be explored in turn in the following sections.

Identity

Norton (2013) draws on the poststructuralist approach to the unfolding of *identity*, defining it as multiple, changing across time and space, and a site of struggle. In simple terms, being "multiple" suggests that an individual embodies various selves (Burke, 2003); for example, a student can simultaneously identify as a university member, a daughter, and an activist. The "contents" of these identities reflect the specific attributes and roles the student assumes (Burke, 2003). "Changing" emphasises the dynamic nature of identity—it is not static but is co-constructed and negotiated within varying contexts. For instance, an L2 English learner may see themselves as a "proficient language user" in an accent-friendly classroom but may feel marginalised and perceive themselves as a "poor English learner" in settings dominated by L1 speakers.

The characteristic of identity as a "site of struggle" is a key feature of the poststructuralist perspectives. This struggle can involve conflicts between one's habitus and desires, competing ideologies and imagined identities (Norton, 2013). This notion of struggle reflects the complex interplay between language, power, and identity.

Wodak (2012) identified three dimensions of power that relate to language: the first dimension, "power in discourse", involves the struggle for the hegemony of meanings and the interpretation of terms and discourses, such as the establishment of conventions for linguistic codes. The second dimension, "power of discourse", refers to the influence of accumulated social knowledge - norms, ideologies, and values - that shape individuals' actions and identities. The third dimension, "power over discourse", concerns speakers' access to the public and reflects the extent to which a speaker is heard and recognised as legitimate (Wodak, 2012). Usually, L1 speakers are seen as more authoritative and "standard" bearers of a language than L2 speakers (Lowe, 2020). However, through agency, L2 speakers struggling with their language identity can redefine their relationships and adjust their language ideologies to claim

more powerful identities (Norton, 2013). This is also applicable to language teachers, who need to navigate power dynamics in the classroom and are subject to coercive power relations within their schools and the wider education system. Like L2 students, they can construct more powerful identities and use the multiple nature of identities to improve language teaching outcomes (Norton, 2016b). Research on investment often focuses on the third dimension, power over discourse, to discuss power.

Identity and Language. The complex interplay between language and identity is based on the premise that language is both "constitutive of and constituted by language learners' identity" (Peirce, 1995, p. 13). On the one hand, language forms an integral part of one's self-concept (Weedon, 1996), as evidenced by individuals' unique ways of expression (Tabouret-Keller, 2017). On the other hand, L2 speakers themselves actively negotiate their identity through the value they attach to a language, which significantly influences their efforts to learn it (Lai et al., 2015). As mentioned above, those L2 speakers who see the target language as a means to gain capital and power often demonstrate a strong commitment to language learning, which in turn enables them to adopt new identity positions (Norton, 2016a). Conversely, L2 speakers who struggle to validate their linguistic abilities and feel undervalued or unrecognised in communication may exhibit detrimental language learning behaviours. For L2 teachers, they are L2 speakers themselves, but they also play a role in students' development of L2 skills and recognition in the L2 community. Therefore, exploring the identity of L2 English teachers can provide crucial insights into both students' and teachers' language investments and learning practices.

Socio-material Approach to Identity. While the poststructuralist view of identity has become one of the most influential approaches in current investment research, relying exclusively on this single perspective to explain such a complex concept can be limiting for researchers (Fisher et al., 2020). When theorising teacher identity, openness to multiple theoretical approaches can gain a better image of the processes and contexts of identity construction (Varghese et al., 2005).

A socio-material approach to identity is particularly relevant today given the widespread integration of multimodal technologies in language teaching and the need for teachers to be literate in a variety of semiotic domains (Gee, 2004). Examining the ways in which digital technologies, together with non-technological material objects, contribute to teacher identity and L2 learning/teaching has been a promising area for investigation, but research is lacking (Norton & Toohey, 2011). The practicality of integrating socio-material perspective with the poststructural perspective is supported by Toohey (2018a), who argued that researchers have the freedom not to deconstruct or reject the poststructural perspective, but to build on it.

Driven by this initiative, this research also uses the socio-material perspective to unpack identity. The socio-material perspective still privileges human subjects in interpreting the relationship between the individual and the environment, but no longer excludes the critical role played by the material (referring to all non-human elements) in shaping everyday practices and knowledge (Fenwick et al., 2011). A key concept within the socio-material perspective is imbrication. The term derives from ancient tile architecture, where ‘tegula’ and ‘imbrex’ interlocked pieces were used to create roofs, and now refers to the interweaving and joining of human and material agency (the innate physical properties of material artefacts that enable or constrain their use) over time to produce socio-material outcomes such as the class rubrics (Leonardi, 2011, 2013). In the context of language teaching, it is through teachers’ classroom practice that social and material agencies become constitutively entangled through the process of imbrication (Leonardi, 2013).

From this socio-material perspective, identity emerges from ‘agential cutting’, the way in which different forces within a group are separated (Barad, 2007). Everything in a group (such as people and materials) has boundaries that are not clearly defined, making it difficult to separate the identity of any one element (Barad, 2007). For example, when analysing a teaching event, one might focus exclusively on how people interact with each other while ignoring other interactions between materials that are also part of the event. Thus, identity is a “dynamic and relational phenomenon/event with agency distributed among assemblages of human and non-

human things, and language learning as intra-actions among different kinds of stuff" (Toohey, 2018a, p. 87).

Studies on the Socio-material Approach to Teacher Identity. A small number of studies have attempted to apply the socio-material approach to teacher's identity construction in recent years. Toohey (2018b) writes extensively about the socio-material approach to identity and classroom practice, recalling her transition from the sociocultural perspective to emergent socio-material perspectives. Through the analysis of empirical classroom data, she reinterpreted classrooms as assemblages of human and non-human actors. For example, she discussed how material apparatuses such as report cards played an agential role in shaping teachers' perceptions of their students. These report cards allowed teachers to assign identities to students through computerised grids and the metrics used in these evaluations. However, Toohey did not explicitly state the method used for the collection of empirical data. Inspired by Toohey's (2018b) socio-material approach to unpacking identity, Leonard (2023) conducted a narrative study using interviews and focus groups with two L2 English teachers from Saudi Arabia, one in a high school and the other in a university. The findings showed that teachers' identities were intertwined with classroom resources, institutional discourses and teaching policies. Tensions often arise between the identities prescribed by the actors of the institutional system (e.g. supervisors, course books, syllabuses and examinations) and those of the teachers themselves. For example, the presence of a syllabus functioned as a "pre-established boundary" that teachers had to adhere to, even if they wished to be different. The positioning of "good teacher" was co-constructed by the report on student satisfaction with learning (mediated by exam results) and teachers' self-reflection. However, recalling stories can become comforting fictions that people tell themselves and can distract researchers from deeper, more important concerns (Squire et al., 2014). To address such limitations, researchers need to look beyond narrative and seek pluralistic methodological approaches, rather than simply assuming that narrative provides fundamental insights into how life unfolds (Bruce et al., 2016).

One study that employed pluralistic methodological approaches is Howard (2023). This research utilised visual elicitation interviews and classroom observations to examine how the socio-material imbrications present in the online gamification application Kahoot! influenced the professional identity construction of 10 university lecturers. By employing a socio-material narrative analysis, the study revealed that teachers' identity construction was shaped by the affordances and constraints of material agency. Specifically, the affordances of the Kahoot! promoted the positioning of "the creative, collaborative content developer", and "the motivational performer", while the constraints of the Kahoot! led to "schoolteacher" and "disconnected educator".

Overall, for each study, teacher identity is constructed through the imbrication of human actors and materiality that the enactment of materials/technology is not a neutral process, but one that can have transformative effects on the identities of teachers.

Capital

The second construct in Norton's model of investment was *capital*. It was operationalised by Bourdieu (2011) as a synonym for "power", which manifests itself in three fundamental forms: economic, cultural, and social. *Economic capital* is convertible into money, property, and income; *cultural capital* is the knowledge, values, and appreciation of specific cultural forms, usually institutionalised as educational credentials; and *social capital* refers to social connections and obligations. The value of these forms of capital defines one's relative position in society and the power to struggle for what is at stake in that field (e.g., educational, academic, and economic social spaces) (Bourdieu, 2011). The combination of these three capitals is referred to as *symbolic capital*, representing one's prestige (Bourdieu, 1986). Capital that is particularly relevant to English teachers is a form of cultural capital: *professional* or *linguistic capital*, which is teachers' subject knowledge and expertise in teaching English to students, whether they are L1 or L2 learners (Flynn, 2013).

Bourdieu (1977) argued that some forms of cultural capital have a higher exchange value than others in a particular context. Since language can be considered a form of cultural capital (Francis et al., 2009), Norton Peirce (1995) takes the idea further by arguing that different languages may represent cultural capital with different values assigned. When L2 speakers invest in a target language, they bring their existing capital into the classroom, which determines their competence in speaking and understanding the target language (Bourdieu, 1991). Active investors usually hope to gain material resources (e.g., monetary incentives and goods) and symbolic resources (e.g., education and language) from the L2-mediated environment that can in turn increase the value of their cultural capital (Norton, 2000). This can be achieved by exercising their existing capital as "affordances" to obtain more L2-mediated social opportunities (Darvin & Norton, 2016), and their agency to transform this original capital into new symbolic capital (Norton, 2000). Such a fluid conception of capital, however, does not automatically guarantee more valuable capital. The value of capital changes in different spaces as learners gain or lose power as they navigate the classroom (Darvin & Norton, 2015).

This idea also applies to English teachers, as their control over curriculum content affects their professional and/or linguistic capital. Without this control, their capital is likely to decrease (George et al., 2002). For teachers with L2 English learners, their access to English knowledge determines their possession of linguistic capital and their ability to effectively meet the needs of L2 learners (Flynn, 2013). L2 teachers who are themselves continuous learners of English may develop a deeper understanding of L2 speakers' language and literacy development, which further enhances their linguistic capital. Beyond teachers themselves, teachers' understanding of students' symbolic capital (e.g., the languages(s) they speak) as affordances or constraints influences how students are represented (e.g. as legitimate or illegitimate speakers) and whether students are able to form new capital (Darvin & Norton, 2016).

Studies on investment, including operationalisation of capital, are discussed in the section on empirical studies on the model of investment, as it is not often presented in isolation from other constructs of investment.

Ideology

The model operationalises *ideology* as more of an umbrella term, meaning "a normative set of ideas … constructed by symbolic or world-making power" (Darvin & Norton, 2015, p. 43). The integration of ideology into the model of investment was inspired by De Costa's (2010) call for a systematic ideological framework that addresses orientations towards constructs such as "subjectivities" and "cultural models" in SLA research (Darvin & Norton, 2015). As mentioned earlier, examining how ideologies function allows researchers to analyse not only how power manifests in different scenarios, but also how power structures allow or restrict access to the spaces in which these scenarios take place. Consequently, through ideology, researchers can explore the relationship between people's communicative practices and their systemic patterns of control.

Of the various types of ideology, language ideology is particularly relevant to this research context. It is defined as "the systematic study of ideas, beliefs, perceptions, understandings and interpretations of language" (Wang, 2020, p. 4), and influences the valuation of languages, the formulation of language policies/preferences - whether formal or informal, top-down or bottom-up - and the construction of identities. Therefore, the study of language ideologies can reveal how individuals understand language conventions in relation to power, as reflected in their explanations and choices regarding language use (Silverstein, 1992). Blommaert (2006) argues that any analysis of language interactions between students and teachers inherently explores the ideological forces that underpin these interactions.

Two language ideologies are particularly relevant to the context of teaching English in China: *Standard English ideology* and *Global Englishes*. The *Standard English* ideology, often associated with notions of "authenticity", "standard" and "conformity", privileges L1 speakers over L2 speakers and perpetuates a native/non-native hierarchy in the social structure (Wang, 2020). This is evident in Chinese schools' preference for L1 English speakers (even those who are not well trained) over experienced L2 English teachers, who are often paid less in comparison (He & Miller, 2011). *Global Englishes*, on the other hand, was an inclusive paradigm that

integrates the research strands of World Englishes, English as an International Language and English as a lingua Franca (Rose et al., 2021). The underlying ideology of Global Englishes sees English as a plural with global ownership, valuing the diversity of English used around the world. In the context of English language teaching, Global Englishes promotes respect for diverse English-using cultures and communities, and aims to dismantle the recruitment policies enforced by the ideology of Standard English (Galloway & Rose, 2015).

China's rise in the global marketplace has prompted the Chinese government to rethink its language ideologies, with significant implications for policy and the dynamics of multilingual encounters (Duchêne & Heller, 2012). Ideologies such as *中学为体，西学为用* (learning Chinese for its essence and English for its practical utility and opportunities), inspired by Global Englishes, are increasingly being integrated into educational settings (Fang, 2018). As a result, L2 English teachers in China are now expected to develop a critical understanding of English as a global language and to re-evaluate the interplay between different Chinese dialects and English (Fang, 2018). However, it is important to note that Standard English was deeply embedded in education systems and difficult to be systematically rejected in just a few years. Even those English teachers who strongly support Global Englishes may still feel marginalised and even to some extent conform to some unequal norms (e.g. double standards of treatment) (Widodo et al., 2020). The struggle for professional legitimacy, especially when working with L1 English speakers, is still an issue for L2 English teaching in China.

Empirical Studies on the Model of Investment

Teachers' Language Investment

Among the small number of studies exploring teachers' investment in their classrooms, Reeves (2009) analysed a case where an L1 English teacher Neal consciously labelled English Language Learners (ELLs) the same as L1 English-speaking students. This decision was driven by Neal's ideology that acknowledging a different identity position for ELLs would expose him as being out of touch with their needs and not competent enough to teach them, which conflicted with the competent

teacher identity he wanted to uphold. Thus, Neal invested in the identity of ELLs to position himself as a 'competent teacher' who was equally capable of meeting the needs of all students. However, this act disregarded for the significant linguistic differences between ELLs and L1-speaking students and ultimately hindered ELLs' investment in both English and classroom content. This study highlighted that teachers retain some autonomy in structuring classroom interactions and in choosing the educational goals they wish to achieve with their students. It also reinforced Bucholtz and Hall's (2005) notion that individuals can invest in the identities of others (by positioning others) in order to affirm and reinforce their own desired self-identities.

Another study that applied the investment model to teachers was Stranger–Johannessen and Norton's (2017) case study of Ugandan primary school teachers' investment in the African Storybook (ASb), a website that provides licensed children's stories in multiple languages. The findings showed that through ASb, teachers reframed their identities from simply being "reading teachers" to being "writers", "readers", and "storytellers", and increased their social and cultural capital. However, their teaching efforts were sometimes hampered by prevailing ideologies about the use of students' mother tongue versus English, the practicality of using ASb when it was not administered in the exam, and concerns about teacher supervision. The study concluded that teachers' investment, and the resulting transformation of their identities, was crucial in promoting students' multilingual literacy.

However, even in these limited teacher investment studies, such as Reeves (2009) and Stranger–Johannessen and Norton (2017), the focus remains predominantly on L1 teachers rather than L2 teachers who are arguably mediated by their identity as L2 learners themselves and are often still engaged in the language learning process (Kanno & Stuart, 2011; Norton, 2016b). This presents a major gap in the literature in this domain.

Chinese L2 learners' English Investment

Furthermore, there is a scarcity of research on L2 teachers' investment in the Chinese context. Most existing studies focus on Chinese L2 learners' investment (e.g.,

Gu, 2008; Jiang, 2018; Jiang et al., 2020; Norton & Gao, 2008; Teng, 2019; Yuan, 2023). Given that L2 teachers are also continuous learners of English, researchers could extrapolate findings from studies of L2 learners' investment to examine potential overlaps or contrasts with L2 teachers' investment. The following section discusses several studies on Chinese L2 learners' English investment.

Research on Chinese university students' English investment suggests that the ideology of Standard English has been embedded in educational systems. Yuan's (2023) study, which conducted semi-structured interviews with 10 English major university students in China, found that a "native" English accent became a crucial form of capital and an attribute of the imagined identity to which learners aspired. Participants perceived L2 students with fluent American or British accents as "good English learners," and those with strong English literacy and test-teaching skills as "good English teachers".

In tertiary-level EMI institutions, L2 learners' ideologies have been found to be in conflict. Zhang's (2024) study of 4 Chinese speakers at an EMI university in Hong Kong employed techno-reflective narrative interview (TRNI) to explore students' learning experiences and outcomes. The findings revealed conflicting ideologies manifested in L2 investment, where the ideology of *Englishisation* (seeing English as a mediating language in the regulation and production of identity) interacted with the *Greater China Initiatives* (the promotion of Chinese language and culture) to shape L2 students' learning conditions and outcomes. However, this study focused primarily on how the TRNI is a useful tool for uncovering L2 learners' English investment, rather than delving into Chinese students' English investment per se. For example, the study mentioned that participants who valued L1 as linguistic capital found the use of L1 beneficial to the TRNI without explicitly detailing how L1 capital is used in actual English investment in the EMI setting. Nevertheless, insights from such studies highlight that under the influence of globalisation, which has brought about socio-cultural, economic, and political changes in China, learning English goes beyond mere language acquisition and becomes a site for transforming students' identities, values and ideologies (Norton & Gao, 2008).

The integration of digital tools and technology in English learning also influences students' English investment. For example, Liu and Darvin (2023) examined two Chinese rural EFL learners' language investment in "digital wilds" (interest-based informal digital spaces where people use and learn languages). Through analysing data from semi-structured interviews, observation, and digital artefacts, Liu and Darvin (2023) concluded that digital wilds enable EFL learners to transform from negative positions (e.g., struggling learner) to more powerful identities (e.g., competent English speaker) and acquire linguistic and social capital, which ultimately leads to students' upward social mobility. Similarly, Jiang et al. (2020) conducted a longitudinal case study to investigate the participation of a Chinese ethnic student in a digital multimodal composing (DMC) project and its influence on the student's investment in English learning. In particular, Chinese ethnic minority students are often characterised by a lack of linguistic capital and English proficiency, along with limited access to quality English learning resources (Adamson & Xia, 2011). The study showed that DMC facilitated investment in English by offering the participant access to a collaborative community where she was valued and supported by peers and where her ethnic knowledge was recognised as a significant cultural capital for classroom participation. Digital tools are therefore empowering for positive ethnic identity construction and investment in English learning.

However, a limitation of these studies is that most have focused on one or two individual constructs of the model while neglecting the other (e.g. Liu and Darvin focused only on identity and capital). This act fails to capture the full nuances and strengths of the original investment model and misses the intricate interplay between them that is essential to a comprehensive understanding of L2 teacher investment.

Setting the Scene: Teaching English in Chinese Smart Classroom Contexts

This study focuses on L2 English teachers' investment in the smart classroom. Since the launch of the "Education Informatisation 2.0 Action Plan" by the Ministry of Education (2018) in China, the development of internet-mediated learning environments has been prioritised. By 2021, internet coverage in primary and secondary schools has reached 100 per cent, and multimedia classrooms have

achieved a penetration rate of 98.35 per cent (Qi et al., 2024). Under such technological progress, smart classrooms have gradually become a trend in all schools in China (Qi et al., 2024).

Smart classroom is typically defined as a technology-enabled learning environment that integrates various modern technologies (S. Song et al., 2014). Al-Sharhan (2016) identified five key elements that smart classrooms typically consist of 1) an interactive smart whiteboard, 2) a classroom and multimedia control centre, 3) a computer, 4) audio/video equipment such as projectors, and 5) highly efficient software that allows teachers to control the smart components of the classroom.

In China, the smart classroom is exemplified by the widespread use of the *Seewo Interactive Whiteboard* system and associated software packages (Luo et al., 2023). The system consists of the *Seewo Pinco*, which simulates a traditional whiteboard with additional features such as screen sharing, voting and calling on someone; and *Seewo EasiNote*, which simulates PowerPoint with additional features such as mind mapping, timing and English dictionary (Luo et al., 2023). The system also includes a gamification toolkit that allows teachers to easily create interactive games using available templates.

Under the Chinese smart classroom contexts, L2 speakers' investment has been reshaped. The acquisition of material and symbolic resources is no longer confined to teachers and the classroom but extends to various virtual spaces (Darvin & Norton, 2015). The dynamic nature of these spaces and the increasing diversity of their users means that the asymmetrical distribution of power no longer depends solely on the simple dichotomy between students and teachers, native and non-native speakers (Darvin & Norton, 2015). At the same time, there are salient human-material imbrications that construct identities in the smart classroom (Symon & Pritchard, 2015), which led this study to adapt a socio-material perspective for the analysis of identity.

Summary

Taken together, existing research on the investment model provides a partial picture of L2 teachers' English investment. These studies have predominantly focused

on L1 teachers and L2 learners, neglecting that L2 teachers are both language teachers who have an impact on L2 students and continuous language learners. At the same time, the integration of technology in the classroom is an escalating global trend, with the smart classroom becoming a common phenomenon in China. Given this technological advancement, future identity research should consider the active role of materiality in shaping teachers' identity construction and subsequent teaching practices.

This gap necessitates an exploration of teacher identity through a socio-material lens, examining the complex interactions between human and non-human elements that are in a constant state of flux and transformation. Such research can provide pedagogical insights for designing English teaching practices and materials that better support L2 teachers in constructing powerful identities and enhancing their teaching experiences and outcomes.

CHAPTER 3: METHODOLOGY

This chapter begins with an exploration of the research paradigm, which provides the philosophical underpinning essential to the selection of instruments to address the research question. It then examines the sampling procedures, data collection methods, and data analysis methods. The chapter concludes with a thorough examination of research ethics and trustworthiness with a reflective analysis of the positionality of the researcher.

Research Overview

This research examines the language investment of L2 English teachers in Chinese smart classrooms through the lens of Norton's (2015) modal of investment. This involves how English teachers construct their identities and negotiate their ideologies and capital through their teaching practices. The study has a particular socio-material focus on identity, exploring the intra-actions between humans and non-humans that are constantly evolving in states of identity construction. Six participants have been recruited, one of whom was the pilot participant. A qualitative approach was adopted due to the philosophical underpinnings of the model. Data was collected and triangulated through the instruments of the background questionnaire, diaries, classroom observation and semi-structured interviews to provide a detailed picture of teachers' investment in the smart classroom.

Philosophical Positioning

This research combines two research paradigms (constructivism and critical realism) in an attempt to adopt a distinct socio-material perspective on identity, moving beyond the poststructuralist conceptualisation inherent in the original investment model. Constructivism acknowledges the existence of multiple truths and views knowledge as constructed by social actors (individuals) during their interactions and reflections on experiences (C. G. Lee, 2012). Research that delves into the narratives and experiences of teachers can find a solid theoretical foundation in the constructivist paradigm (Adom et al., 2016). Critical realism, on the other hand, posits that the social and the material are separate and that they become intertwined in ways that produce socio-material practices as people intertwine their agencies (Leonardi,

2013). Its explanatory power lies in explaining "how different entities are related as parts of a greater whole" (Vincent & O'Mahoney, 2018, p. 205).

Constructivist research paradigm was chosen because it aligns with poststructuralism, an approach that challenges the conventional beliefs about "sources and nature of identity, and the rational, humanist subject of the enlightenment" on which the Norton's model of investment was built (Norton & Morgan, 2012, p. 1).

However, as the design of the model of investment engages with the nexus of identity, capital, and ideology, I specifically examined the component of identity using a socio-material perspective. This responds to recent calls from identity scholars to build on the existing poststructural approach to identities to a socio-material condition where identities are also constructed (e.g., Stanko et al., 2022). Importantly, sociomaterialism is often used as an umbrella term, allowing socio-material researchers to stand on various theoretical positions (e.g., agential realism and critical realism) (Guerrettaz et al., 2021).

In this thesis, I draw on the paradigmatic positions of critical realism to interpret sociomaterialism. Critical realism posits that the social and the material are separate and that they become intertwined in ways that produce socio-material practices as people intertwine their agencies (Leonardi, 2013). The rationale for adopting this ontological approach lies in its ability to examine how socio-material practices become entangled over time, a nuance that other theoretical perspectives may not capture. Through the lens of critical realism, identity is understood as a dynamic and relational phenomenon, shaped by agency distributed across assemblages of human and non-human elements.

In summary, this research paradigm is primarily rooted in constructivism, informed by poststructuralist theories and the theoretical framework of the model of investment. However, it also integrates critical realism - a paradigmatic approach to sociomaterialism - to explore the identity aspect of the investment model. This integration does not aim to dismantle the foundations of poststructuralism but rather builds on them by introducing a nuanced exploration of the interactions between humans and non-humans (Toohey, 2018a). This eclectic paradigmatic stance,

embracing multiple perspectives, mirrors the paradigmatic diversity found in previous research (Bogna et al., 2020), and demonstrates the practical application of such merging paradigms.

Research Design

The positioning of the research is qualitative in nature and informs the qualitative design. Specifically, since constructivism sees reality as fluid and shaped by individual perceptions and experiences, it relies on qualitative methods such as interviews to capture these subjective narratives (Tenny et al., 2017). Similarly, critical realism, which sees reality as a dynamic construct shaped by the selection and organisation of available material, may also use qualitative approaches such as interviews (e.g., Fletcher, 2017), case studies (e.g., Easton, 2010), and diary (e.g., Næss & Jensen, 2002) to understand the complex layers of reality from both human and non-human constructs.

An in-depth, small-scale case study of high school L2 English teachers' investment in smart classrooms is conducted. This design is in line with the frequently adopted method of studying investment, which involves a range of qualitative methods that provide first-person accounts to understand the depth and complexity of investment, rather than relying on quantitative methods among a large population (Norton, 2010). For example, Liu & Darvin (2023) conducted a case study using the investment model to explore the investment of two Chinese EFL learners in the digital wild.

Data collection took place from March to June and involved six L2 English teachers in China. Norton's model of investment is the guiding framework for data collection. For each participant, data were collected through a background questionnaire, three diaries and classroom observation. These data were triangulated with a subsequent interview to enrich the data collection process and clarify misunderstandings.

Research Questions

This research aims to investigate how L2 English teachers invest in the language practices of smart classrooms, guided by the following questions:

1. How do L2 English teachers construct their identities in smart classrooms?

2. How do L2 English teachers negotiate their capital in smart classrooms?

3. How do L2 English teachers negotiate ideologies, especially language ideologies in smart classrooms?

I outline the research questions, the data collection methods, and the data analysis methods in Table 1 below.

Table 1

Research Questions and the Corresponding Research Data

Research Questions	**Data Collection Methods**	**Data Analysis Method**
1. How do L2 English teachers construct their identities in smart classrooms?	Classroom observation	Thematic analysis A socio-material narrative analytical approach
	Diaries	
	Semi-structured interview	
2. How do L2 English teachers negotiate their capital in smart classrooms?	Background questionnaire	Thematic analysis
	Classroom observation	
	Diaries	
	Semi-structured interview	
3. How do L2 English teachers negotiate ideologies, especially language ideologies in smart classrooms?	Classroom observation	Thematic analysis
	Diaries	
	Semi-structured interview	

Sampling and Participants

To identify the population of L2 English teachers, the following parameters are used to recruit participants: 1) the participant is an L2 English teacher 2) the participant is teaching students in China 3) the participant teaches in a smart classroom (defined by Al-Sharhan (2016) as an interactive learning space integrated with technological tools and resources to support both teachers and students).

Participants are recruited using snowball sampling, a non-probability technique that uses existing connections to identify potential participants who meet the recruitment criteria. These potential participants then recommend other suitable individuals within their networks to the researcher, similar to a snowball that grows as

it rolls (Naderifar et al., 2017). Snowball sampling is particularly useful for reaching participants who are otherwise difficult to access (Naderifar et al., 2017). In this study, finding participants willing to have their classrooms recorded is challenging due to concerns about critical feedback and some local government scrutiny of participation in international research. In addition, the requirement for a two-and-a-half-hour commitment to the study, particularly without financial compensation, further hampers recruitment. Snowball sampling therefore appears to be a particularly appropriate strategy for this research context.

I first approached two potential participants - one a former teacher and the other a friend who works as an English teacher. They then referred me to their colleagues and friends who were also high school English teachers. Following these referrals, I conducted informal conversations with potential participants to assess their eligibility based on the recruitment criteria. In the end, 9 qualified teachers agreed to participate in the study.

Following Marshall et al.'s (2013) guidance on setting qualitative sample sizes, this study draws on studies that have employed comparable designs and research questions to justify its sample size. Specifically, the sample size of five is consistent with studies focusing on investment models published in leading journals such as *TESOL Quarterly* (e.g., Darvin & Norton, 2016; Han & Reinhardt, 2022; Liu & Darvin, 2023). Therefore, with the nine willing participants, I aimed to achieve a balanced sample of five participants (plus one additional participant for the pilot study) in terms of gender, different levels of students' English proficiency, and different years of English teaching experience.

Instruments

Online Background Questionnaire

Online background questionnaire is used for their time efficiency in collecting straightforward information and can be effectively combined with later, more intensive forms of qualitative data, such as interviews, for more in-depth analysis (McGuirk & O'Neill, 2016).

The design of the background questionnaire was based on Liu and Darvin's (2023) interview questions on language investment. This adaptation was made after I realised that integrating these interview questions into the questionnaire would be time efficient without compromising the accuracy of the data, as opposed to asking them during interviews. The questionnaire consists of eleven simple to complex factual questions. This deliberate number takes into account the limited attention span of participants and reduces inaccuracies due to rushed responses (Adams & Cox, 2008). The first eight questions concern participants' cultural and economic capital (e.g., their levels of education and study abroad experience), while the rest of the questions ask about basic classroom information (e.g., students' proficiency level and year group). See Appendix 1 for the full background questionnaire.

Pilot study. While the statistical reliability of the questionnaire could not be assessed based on a single pilot study, the qualitative feedback provided valuable insights for refinement. The pilot study was conducted with a sample of the same population. The participant was asked to provide feedback on the clarity and ease of completion of the questionnaire. The feedback received was positive and no adjustment was made.

Classroom Observation

Classroom observation is valuable in capturing participants' language practices in natural settings, often revealing behaviours that participants themselves may not be consciously aware of. It can therefore provide information about participants' language ideology and identity, and implicitly reflect the capital (values) they possess and assign. Observation is carried out via videotaping, as this allows the researcher to code the observations thoroughly several times, ensuring that no important aspects of classroom practice are missed (Wragg, 2011).

Each participant is video recorded once for the entire duration of the lesson using Microsoft Teams. Lessons are identified based on the time availability of the participant and the researcher, avoiding lessons that focus predominantly on the exam with little interaction with technology. The focus of the recordings is on the teachers and their interactions with students (students are not present in the video), as well as

digital and material artefacts such as software, screens, papers, and equipment. In situations where video recording is not possible (without consent), detailed field notes are taken as an alternative that can increase the depth of analysis (Howard, 2023).

Diaries

A diary is generally defined as "a spontaneous record of one's experiences, feelings, and reactions" (Murphy, 2008, p. 199). The use of diaries in research allows events and experiences to be explored in their natural setting (Bolger et al., 2003). It also alleviates problems associated with memory loss by reducing the time between an experience and its recall (Bolger et al., 2003). A further advantage is that it provides personal insights that may not be observable in video recordings or covered in subsequent interviews. One challenge with non-standardised diary formats is ensuring the quality and completeness of entries. This issue can be addressed through interviews, which Alamri (2019) suggests as a triangulation method to deepen understanding of diary content. Furthermore, the preparatory act of diary keeping allows participants to reflect and prepare themselves for the interviews, similar to the researcher's preparatory activities (H. Elliott, 1997).

Teaching diaries are typically written in an open-ended, biographical and reflective manner (Hyers, 2018). They can also be structured using Riley's (2005) framework, which guides entries through questions about goals/objectives, comments on activities, challenges, mistakes, successes and personal views. In this research, Riley's framework serves as prompts for participants to reflect on their teaching practices and experiences (See Appendix 2), although they are encouraged to include any additional information that they feel is relevant.

Pilot Study. The teaching diaries were piloted with one participant who met all inclusion criteria. This participant reviewed the provided prompts and composed diary entries accordingly. A key suggestion from the pilot was to address the redundancy observed in responses, where content applicable to one prompt, such as "Challenges/Mistakes" could overlap with others like "Personal Reflection". To improve clarity and reduce repetition, I revised the diary instructions to include the note: "Where there is overlap between sections, repetition is not necessary."

Semi-structured Interview

Semi-structured interview allows participants to elaborate on their identity construction, ideologies and capital, while giving me the flexibility to guide the process and ask follow-up questions (W. Adams, 2015). Narratives of personal experience also facilitate the uncovering of their discursive-material engagements within teaching and language practices (Cecez-Kecmanovic et al., 2014). I developed an interview protocol (Appendix 3) to elicit data related to participants' investment in the smart classroom. This protocol was adapted from Liu and Darvin's (2023) interview protocol for investigating individuals' language investment, with modifications based on Hultin's (2019) guidance on interviewing from a socio-material perspective and data collected from the previous phase (e.g., follow-up questions on participants' online diaries). Specifically, questions are structured around four themes: smart classroom, online diaries, English teaching/learning trajectory and reflection. During the theme of the online diaries, I presented their diaries to facilitate reflection and to clarify any misunderstandings that arise.

Pilot Study. The researcher observed that the pilot participant was comfortable discussing his teaching experiences and identity construction. However, two revisions were made in response to the participant seeking clarification: 1) For the question, "What time and effort have you devoted to learning English before and now?" the participant was uncertain whether "informal learning" should be included. To address this, the clarification "informal learning is included" was added to subsequent interviews. 2) The question "What do you think is the goal of a lesson?" was considered by the participant to be too broad and could be answered from different perspectives. Therefore, it was rephrased to "What do you think is the goal of students learning English?" to better capture the intended inquiry.

Procedure

After recruitment, participants signed consent forms and received questionnaires distributed via SmartSurvey. These were administered online to maximise time efficiency and accessibility, and each took an average of two minutes to complete.

Once the background questionnaires had been collected, I contacted the participants to select the recorded lessons and arranged a virtual meeting via Microsoft Teams for classroom observation. The duration of the observation depended on the length of the lesson.

Following the online observation, the participants were asked to complete teaching diaries using SmartSurvey. These entries, which took approximately 10 minutes each to complete, could be written in English, Chinese, or a combination of the two, depending on the participant's preference. To avoid diary fatigue, participants were only required to complete three entries: one immediately after the observed lesson and two more after subsequent lessons within the same week.

In the final stage, semi-structured interviews were videotaped using Microsoft Teams. To ensure that important information was not lost due to language proficiency or culturally specific expressions, participants could choose to communicate in Mandarin, English, or both. They were notified when the recording started and stopped. Each interview lasted approximately 50 to 60 minutes.

Data Analysis

Data Transformation

Questionnaire responses were downloaded from SmartSurvey and presented as different factors in tables in Microsoft Word to show participants' demographic information, classroom details, and the economic and cultural capital they possess.

The video recordings were carefully transcribed by playing the footage in NVivo, a qualitative data analysis software. I noted the times of significant events, saved them as "time selection", and coded them, a process described in more detail in the following section.

Diary responses were also retrieved from SmartSurvey. Entries originally written in Chinese were translated into English by the researcher. This approach provides the researcher with valuable insights into cross-cultural meanings and interpretive nuances, bringing the researcher closer to the complex issues of meaning equivalence in the research process (Temple & Young, 2004). Subsequently, each participant's

three diary entries were compiled into a cohesive dataset and uploaded into NVivo for coding.

Interview transcripts were obtained from Microsoft Teams, with the researcher conducting a thorough cross-check against the audio recordings. The transcript was then uploaded to NVivo for coding. Data was collected in whatever language that participants were most comfortable responding in, mostly Chinese. Where excerpts are included in the Discussion and Finding chapter, these are translated into English. (See example of an excerpt and its translation in Appendix 4). All codes are generated in English.

Coding

Coding is usually conceptualised as a "decision-making process, where the decisions must be made in the context of a particular piece of research" (V. Elliott, 2018, p. 2851). I follow V. Elliott's (2018) framework to develop and tailor codes specifically for my research questions and context.

Coding Procedure. I employed hybrid coding (both inductive and deductive) given its pragmatic use for the research questions (Swain, 2018). Three levels of coding were conducted. At the first level, as informed by the Literature Review section, three themes were identified as *a priori* codes (Table 2):

Table 2

A priori codes informed by the model of investment

Identity	A dynamic and relational phenomenon, shaped by agency distributed across assemblages of human and non-human elements.
Capital	Power in various forms (economic, cultural, social).
(Language) Ideology	The systematic study of ideas, beliefs, perceptions, understandings and interpretations of language that determine modes of inclusion and exclusion.

I went through the data with these a priori codes and noted relevant data that fell under these codes.

At the second level, within each of these themes (a priori codes), I took an inductive approach by going back through the codes I had generated and looking for emergent sub-themes. I then followed Braun and Clarke's (2006) approach to check the sub-themes for consistency with the a priori codes and the overall investment model. These emergent sub-themes were given new names and descriptions. My priority was to ensure that their names effectively captured the essence of their content and that their length was kept to the word or short phrase level. I also kept a record of the definitions of these emerging codes to ensure their consistency.

At the third level, I adopted a socio-material lens to the coding of identity. The sole focus on identity was driven by my research question and the literature supporting a socio-material narrative analytical approach to identity (e.g., Symon & Pritchard, 2015), which allows for a meaningful application in my research and facilitates comparison with other findings.

As proposed by Symon and Pritchard (2015), the socio-material lens to coding is built on the existing two levels of coding. I went back to the a priori codes and emergent codes related to identity and their corresponding raw data. I then analysed these raw data by exploring how identities are manifested through the socio-material intra-action between human and material use, and how the recursive processes of resistance and accommodation are manifested in practice (Symon and Pritchard, 2015). Specifically, I explored how teachers' intra-actions with the agency of (digital) material either supported or constrained their pedagogical/language practices, and how it enhanced or undermined their identity positioning (Howard, 2023).

Reliability. The reliability of the coding is also a key concern. This includes inter-rater reliability (how consistent different researchers are at measuring the same phenomenon), and intra-rater reliability (how consistent an individual is at measuring a constant phenomenon). Given the large volume of transcripts, I assessed inter-rater reliability by extracting one 15-minute interview transcript and 50% of one diary entry (Belotto, 2018). I then presented the coding scheme to an L1 Chinese classmate from my MSc Applied Linguistics programme and asked her to code the data. The discriminant ability, a form of inter-rater reliability for

qualitative research data, was 82.98%, exceeding the 80% cut-off point and indicating the consistency and reliability of the coding (Campbell et al., 2013). In terms of intra-rater reliability, I coded a clean version of a section of the diaries and transcript one week after the initial coding. The comparison of the coding results showed the consistency of my coding.

Ethical Considerations

This research followed the guidelines of the Central University Research Ethics Committee and received ethical approval from the University Ethics Committee (See Appendix 5). Participants were provided with an information sheet detailing the research objectives, methods, potential benefits and risks of participation, and measures taken for data protection and storage. They were given one week to read the information sheet and willing participants responded with a consent form.

The participants were assured that confidentiality and anonymity would be maximised by using pseudonyms for their names and institutions. Any data that could not be fully anonymised but was essential to the study was handled in a way that ensured these details were not specific enough to identify the participants. As discussions of identity and ideology can be sensitive, participants were reassured of their right to withdraw from the study up to a month and a half before the dissertation was due. During the interviews, I focused on building rapport with participants and emphasised their autonomy to pause or end the interview if they felt uncomfortable.

Trustworthiness

Of great importance to the rigour of qualitative research is the discussion of trustworthiness. Lincoln and Guba (1985) have divided trustworthiness into the components of credibility, transferability, dependability and confirmability, which are discussed in the following section.

Credibility

Credibility refers to the ability of the researcher to represent the truth from the perspective of the sample, considering the complexity of a study (Guba, 1981). Due to the time constraints of the research, it is not possible to have prolonged participation to mitigate the influence of the researcher on the behaviour of the

participants during classroom observation. However, I employed peer debriefing and triangulation to achieve credibility. After data collection and analysis, I discussed my research procedures, findings and interpretations with a peer from the MSc Applied Linguistics programme who was not involved in the study. With her insights, I challenged some of my assumptions and biases and explored some alternative perspectives to ensure the thoroughness and accuracy of the research. At the same time, the triangulation of methods through the use of questionnaire, observation, diaries and interview provides multiple sources of information and enhances the contextual validation of the data (Lincoln & Guba, 1985).

Transferability

Transferability, in the simplest sense, refers to the applicability of findings to other settings, parallel to generalisability in quantitative research. However, due to the inherently small sample size, neither single nor multiple case studies lend themselves to statistical generalisation (A. Lee & Baskerville, 2003). Rather, the focus is on the specific context of the participants, suggesting that the aim is not to create universally applicable truths but to formulate statements that are relevant to the context at hand (Guba, 1981). This resonates with Gibbert and Guirok's (2010) argument that the generalisation goal of the case study is to achieve analytical generalisation. This form of generalisation extends from empirical observations to the development of theory rather than to broader populations. In this thesis, I presented detailed descriptions of both the data and its context, allowing the reader to make comparisons with other settings. At the same time, my attempt to integrate the socio-material perspective into the investment model could arguably enhance its theoretical framework, thereby contributing to its analytical transferability across contexts.

Dependability

Dependability refers to the stability of the data. To ensure dependability, researchers need to be transparent about the research process and reporting (Lincoln & Guba, 1985). I was transparent about any changes made (e.g. revisions after the pilot study) and kept a record of how data were collected, how decisions were made,

how data were analysed, and how conclusions were drawn, as shown in this Methodology chapter.

Confirmability

Confirmability is the objectivity or neutrality of the data, which is a major concern in qualitative research. This is because qualitative researchers are already embedded in their physical, mental and experiential realms and cannot detach from their situated and subjective gaze when attempting to explain reality (Hultin, 2019). Two main steps have been taken to increase the confirmability. First, as mentioned above, the use of triangulation enriches the data by combining direct observations with participants' reflective insights from interviews and diaries. This strategy effectively reduces potential biases arising from the researcher's predispositions. Secondly, a commitment to reflexivity encourages consideration of the researcher's positionality within the context of the study. As a part-time L2 English teacher, I was an "insider" to the research, sharing a similar background with the participants, which facilitated a deeper understanding of participants' experiences and fostered rapport. However, Berger (2015) cautions researchers who are members of the communities being studied to critically examine their data collection and interpretation processes due to potential preconceived biases or assumptions. Therefore, by acknowledging my insider status, I frequently reminded myself that my presence could influence participants' responses and warned myself that similar backgrounds do not mean similar experiences. Openness to learning from participants' unique perspectives was a priority.

CHAPTER 4: FINDINGS AND DISCUSSION

In the following chapter, each research question is addressed in turn, and the findings are presented alongside a discussion of the relevant theoretical and empirical literature in the field.

Participants' Demographic Information

Five L2 English teachers from senior and junior high schools were recruited for this study. All participants are from the southern part of China, representing four different cities, with teaching experience ranging from one to ten years. Rachel stands out in the sample as she is based in the Guangxi Zhuang Autonomous Region, where her classroom includes ethnic minority students who speak Tai as their L1, Mandarin as their L2, and English as their L3. Participants self-reported their students' English proficiency relative to their peers in the same city cohort, based on their students' average scores on the city's unified examination. Detailed participant information is provided in Table 3.

Table 3

Participants' Demographic Information

Participant (pseudonyms)	**Gender**	**Highest level of education**	**Study abroad experience**	**Years of teaching**	**Grades taught**	**Teacher's self-reported English level of students (compared to students in the same region)**
Rachel	Female	Bachelor's degree	None	3-5 years	Year 9	Average (The cohort consists of ethnic minority students)
Wendy	Female	Postgraduate's degree	1 year study in the UK	3-5 years	Year 11	Average
Frank	Male	Postgraduate's degree	None	Less than a year	Year 7	Above average
Taylor	Female	Postgraduate's degree	1 year study in the UK	2 years	Year 11	Average
Zack	Male	Bachelor's degree	None	5-10 years	Year 8	Above average

Data were collected through classroom observation, diaries and semi-structured interviews. The instrument of the background questionnaire provided supplementary data in analysing the theme related to capital.

Summary of Findings

Table 4 provides a summary of the main research findings, organised around the three themes of identity, capital and ideology. The table also presents the sub-themes that emerged from the data along with their corresponding codes. Each theme addresses the research questions in turn. The first theme, identity, is analysed through a socio-material lens, whereas the other themes are through a poststructural lens.

Table 4

Summary of Findings

Themes	**Sub-themes**	**Codes**
Identity	Language facilitator	• Efforts to maximise students' English output • Actively monitoring students' English learning
	Motivator	• Encourage students to engage in self-directed language learning • Ask students to accumulate knowledge selectively
	English attrition sufferer	• English materials available are too easy • Institutional constraint on learning • Imagined identity as continuous English learner
	Insecure English teacher	• Being corrected by students • Co-learning between teachers and students • Students are quick learners in technologies and often master these technologies better than teachers
Capital	Ambivalent attitudes towards Chinese as a valuable linguistic capital	• Preference for English over Chinese • Chinese as an unwanted capital in the classroom • L1 can facilitate comprehension and increase classroom efficiency
	Use of existing capital as an affordance for the teaching of English	• Educational background as cultural capital to inform their teaching strategies • Cultural capital being challenged by the exam-oriented education system
Ideology	English learning for communication	• English as a lingua franca

		• Accent is not a problem if the communicative purpose is achieved • Students' deployment of their multilingual repertoires
	English learning for cultural exchange	• Using English to learn from other cultures • Using English to spread Chinese culture
	Ideologies under exam-oriented English education	• Standard English and Native-Speakerism • The practicality of innovative approaches to teaching English • Exercising agency to maintain a communicative approach to teaching English

Research Question 1 - L2 Teachers' Identity Construction

The following sections address RQ1 on how L2 English teachers construct their identities in the smart classroom through a socio-material lens. This approach is adopted because beyond the reciprocal process of identity construction between students and teachers (e.g., teachers investing in the identity of students to define themselves), various socio-material teaching imbrications, such as the interweaving of human and technical/material agency, function to construct the identities and relationships between teachers and learners, as well as the nature of the knowledge that becomes accessible to teachers and students (Postma, 2012). In the smart classroom, salient examples for the analysis of human-material imbrication can be found, with the affordances or constraints of the smart classroom materials influencing teachers' identity construction (Symon & Pritchard, 2015). The analysis revealed two different categories of teacher identity. The first category emerged from the affordances of smart classrooms: *Language facilitator and motivator*. The second category encompassed the socio-material constraints teachers negotiate that may compromise their positive identities, labelled as *English attrition sufferer* and *insecure English teacher.* These identities will be addressed in turn in the following sections.

Language Facilitator

The affordance of the interactive whiteboard allowed participants to position themselves as the language facilitator. Such an identity was co-constructed through the material agency afforded by the functionalities of existing templates and kits to

develop courseware, and the enactment of human agency by allowing teachers to build their own activities and thereby derive a sense of responsibility and accomplishment.

Most participants contextualised language facilitators as actively scaffolding students' English learning through innovative designs of classroom materials to elicit as much English output from students as possible. These efforts were particularly evident in situations where students were disengaged or unfamiliar with the topic:

> The general classroom atmosphere among the students was a bit dull. To stimulate their thinking, I asked some students to use the interactive whiteboard to create mind maps and then share them with the rest of the class. (Taylor, diary)

> Various multimedia resources are incorporated into lessons and activities to stimulate students' interest in learning and speaking English. (Wendy, diary)

> As a relatively inexperienced teacher, I have used strategies to improve student learning. For classes where students tend to be disengaged … I spend about 7 to 8 minutes letting students play two or three rounds of video games … I often choose competitive vocabulary games because students really enjoy them. In these games, different bubbles appear on the screen and two players compete in accuracy and speed to match Chinese with English. (Taylor, interview)

From these excerpts, Wendy and Taylor used the smart classroom features, either the interactive whiteboard or the video games, to compensate for the dull classroom environment where students were producing limited English output. By carefully selecting and designing multimodal materials, they have been able to encourage students to use more English, shifting the classroom dynamic from teacher-centred to student-centred. This increased focus on students and their language output signifies the teachers' developing expertise in facilitating language learning (Borg, 2015). More importantly, it indicates their transformation from a mere focus on material preparation to an increase in teaching competence, characterised by increased knowledge of students and improved student-teacher interactions in the classroom (Pennington & Richards, 2016). Thus, it could be argued that the affordances of the smart classroom enabled participants to shift from a negative position as novice

teachers to a more positive role as language facilitators, resonating with Wenger's (1999) idea that facilitating learning goes beyond supporting the process of knowledge acquisition. It involves creating an environment in which new ways of understanding can be achieved through teacher identity formation (Wenger, 1999). Furthermore, the participants' role as language facilitators was also reflected in the practice of actively monitoring students' English learning to ensure progress and accuracy:

> After reading an article on "love", a fill-in-the-blank exercise was presented on the screen to review the main ideas and new words in the article, with the aim of consolidating the plot and vocabulary. (Wendy, diary)

In this context, Wendy's use of the interactive whiteboard was more routine and less creative compared to her previous usage. However, this does not position her negatively. The efficiency afforded by the interactive whiteboard, compared to paper exams, allows her to check students' progress immediately after instruction, extending her human agency in formatively assessing students. Unlike Wendy, Rachel monitored students' progress more creatively:

> I often select games that pit two students against each other to test their knowledge of vocabulary, key phrases and grammar. During the game, phrases that I have set appear on the screen, either correct or incorrect. If a student clicks on an incorrect answer, the score difference between the two players increases. This method is an effective way of checking students' understanding of the material, and I can note any areas where students need improvement … This gives me the feeling that I am actively facilitating students' learning by identifying learning gaps and filling them. (Rachel, interview).

The affordances of the interactive whiteboard were convened to enable a socio-material outcome (Howard, 2023): the creation of teachers' own style of English games. Taylor valued L2 output and saw it as instrumental in facilitating student learning. The games she created were therefore designed to encourage students to

produce more English words. In contrast, Rachel saw monitoring as a key aspect of facilitation and designed games to check students' understanding. Although Taylor and Rachel set different goals for their artefacts (English games) due to their differing human agency, these artefacts circulate digitally, shaping their actions and simultaneously reinforcing their similar positionings as facilitators (Paring et al., 2017).

Motivator

Participants enacted a range of motivational roles, mobilising technology within and beyond the smart classroom to encourage students to engage in self-directed language learning, and acting as cheerleaders for students' English learning:

> After watching a video about the newly released ChatGPT 4, I realised that I was more than a content deliverer but a motivator, encouraging students to explore what knowledge is, how to acquire it and how to use available resources. They need to find appropriate methods to learn and apply knowledge. This will better prepare them for independent learning in today's technologically mediated future. (Frank, interview)

Frank's narrative exemplifies how the material agency of ChatGPT 4 (a chatbot and virtual assistant) indirectly inspired him to become a motivator, equipping students with essential independent learning skills both inside and outside the classroom. This shift was also reflected during the classroom observation, where I witnessed Frank moving away from asking students to memorise English articles verbatim. Instead, he encouraged them to retell stories using multimodal media such as PowerPoint. When pressed for a reason, Frank explained that English learning today should be tailored to individual situations, with students mastering the technical skills and applying them to L2 acquisition. What Frank highlighted are examples of self-directed learning skills and an appropriate level of technical proficiency (Reinders & Hubbard, 2013), both of which are crucial for effective self-directed language learning (defined by Song and Hill (2007) as a process in which students take the initiative to bring their prior knowledge into the learning context, mediated

by various designs and supports, and to plan, monitor and evaluate their language learning in order to improve their language skills).

By encouraging students to develop these necessary skills for self-directed language learning, Frank moved from positioning himself as a 'content provider', repeating what was on the site, to more of a 'skill-enhancing motivator'. This shift in identity was indirectly influenced by the material agency of ChatGPT 4, which inspired Frank to reimagine his role.

In Taylor's case, the affordances of online dictionaries directly interacted with her belief in 'accumulating knowledge as needed', convening to cultivate a motivator identity. Specifically, she made the online dictionary installed in Seewo available to all students and encouraged them to design their own word lists:

> I ask students to accumulate knowledge selectively. They need to know what they need and allow themselves to let go of what they don't. For some students, it's important to keep striving for higher levels. So, I motivate them to accumulate more obscure vocabulary or concepts using the online dictionary and add them to the word list … They take responsibility for their progress, and I feel rewarded. (Taylor, interview)

Taylor utilised the affordance of the publicly available online dictionary to enact her belief that students should accumulate language knowledge on demand. Her encouragement drove students toward self-directed language learning beyond the classroom, where they are likely to experience identity negotiation, transforming from passive 'knowledge recipients' to more active positioning of 'owners of learning'. This is a reflection of the co-construction of identity in which investing in the identities of others can affirm and reinforce one's own desired self-identities (Bucholtz & Hall, 2005). Thorne and Black's (2011) research found that self-directed language learning in digital landscapes offers new opportunities for co-constructed identity formation between teachers and learners. Taylor leveraged the affordance of the smart classroom, the online dictionary, to position students as the 'owner of English learning', which in turn reinforced her positive identity as a motivator who

facilitates students' positive identity construction. This highlights a compelling area for future research on learner identity.

English Attrition Sufferer

Despite the positive identity transformation of some participants, the material constraints mediated by institutional discourse also led to negative identity construction. This was evident in participants' self-positioning as English attrition sufferers and insecure English teachers.

All the participants, regardless of the number of years they had been teaching, had noticed a decline in their English level. This could be in a particular skill (reading, listening, speaking and writing) or in their overall English proficiency. For example, Frank complained: "*My listening skills have declined rapidly after entering the workplace. I sometimes struggle to follow others' conversations*". Similarly, Taylor mentioned an adage that she believed was common among L2 English teachers: "*If you teach students for a long time, your English skills will eventually deteriorate*".

This finding was unexpected as L2 English teachers use English on a daily basis. The participants offered two reasons. First, the English materials available in the smart classroom were too easy for both students and teachers. For example, although the affordances of the online dictionary can easily facilitate the creation of flashcards and electronic icons for English pronunciation, the content remains a relatively basic resource for ESL teaching (Luo et al., 2023). As a result, participants did not acquire new knowledge of English and faced the attrition of their previously acquired higher-level English skills due to memory loss without recall:

> I find that the English resources available in the Seewo are too simple. It can only check if students have mastered basic vocabulary without delving deeper, which limits both the students' and my growth. (Rachel, interview)

Rachel's narrative revealed the limitations of the smart classroom, where advanced English materials were not built into the system, limiting Rachel's ability to

achieve her goal of improving her English through her teaching. This case illustrates how the salience of non-human agency (the constraint to provide advanced resources for students and teachers), which resides in material artefacts, can challenge absolute human agency (the initiative of teachers and students to improve their English proficiency) (Howard, 2023).

In addition, one factor that distinguished Rachel's case from the other participants was that Rachel's class consisted of ethnic minority students: the Zhuang Tai-speaking ethnic group who speak English as their L3 and Mandarin Chinese as their L2. In contrast to the previously discussed study by Jiang et al. (2020), which found that digital tools led to positive identity construction and English investment among ethnic minority learners, this study revealed negative English investment. A possible justification is that the Seewo are a nationwide implementation across Chinese smart classrooms with Mandarin Chinese (the L2) and English (the L3 for L1 Tai speakers) as the languages available (Lu, 2013). Thus, both teachers and students need to be proficient bilingual speakers in Mandarin and Tai to be able to teach and learn English otherwise they cannot understand the transitional language - Mandarin (Lu, 2013).

The second reason for teachers' language attrition relates to institutional constraints. English teachers were under a lot of pressure to deal with the curriculum standard set by the government, the overall management of the class, and executive duties. This left the participants with little time to improve their English:

> I am under lots of pressure to retain high-quality students for our school's family high school. Therefore, I have many tasks beyond teaching English. Due to these work responsibilities, I don't have much time to further my own English studies or improve my skills. (Zack, interview)

> I often find that it takes extra time to meet the curriculum standards set by the school. In addition, the curriculum standards focus more on reading and less on listening. As a result, I don't have much time to improve my own listening skills and the time I spend learning English while teaching has decreased significantly. (Wendy, interview)

In these two extracts, Zack and Wendy were constrained by the institutional regulation that prevented them from learning English in their free time. The socio-material imbrication was more evident in Wendy's case, where the curriculum standards are material apparatuses in the smart classroom that have agency in how she carries out teaching and what she teaches. The various instructions listed in the curriculum standards become material ways of assigning Wendy's English attrition sufferer identity. However, even though all participants perceived the constraints of the smart classroom as driving language attrition, Rachel has exemplified how individuals can exercise human agency to resist the assigned positioning (Norton, 1997):

> Before I became a teacher, I saw myself as a lifelong learner of English, but with the many responsibilities and pressures of school, I found that I didn't have time to study systematically … I can learn in bits and pieces [instead]. For example, when I see an object in everyday life, I think of the English translation and look it up in a dictionary if I don't know it. (Rachel, interview)

In this narrative, Rachel initially identified herself as a continuous English learner. This was her imagined identity, the identity constructed in the imagination in relation to the future world, before coming to work as an L2 English teacher (Barkhuizen, 2016; Xu, 2012). After turning to the smart classroom, her imagined identity was challenged by the resources available to her and she was faced with the position of language attrition sufferer. Rachel, however, did not succumb completely but concretised her imagined identity by engaging in fragmented English learning. Rachel was the only participant in the sample who actively sought out opportunities to learn English. It is not clear from the data why Rachel took such a proactive approach. It is possible that teachers with a clear imagined identity approach their practice differently.

This finding is consistent with Xu's (2012) study of K12 English teachers, which found that institutional pressures often lead to the collapse of imagined identities and their negative substitutes. However, as Rachel's case illustrates,

human agency and effort can sometimes lead to positive investment and help maintain imagined identities.

Insecure Language Teacher

Another negative identity that manifested itself in the data was the insecure language teacher. This insecurity stemmed from the participants' realisation that students sometimes knew more than them in English, especially when students had access to the internet in the smart classroom. For example, during a classroom observation, one student asked Taylor why the answer was "tricky" instead of "messy". Taylor explained that the context required a word to express the meaning of complicated (棘手的). The student challenged this explanation by looking up "messy" in the online dictionary and found that it also had the meaning of complicated:

> Honestly, I didn't know "messy" could mean "complicated" before that lesson, which made me feel a bit embarrassed. (Taylor, interview)

Taylor's experience suggested that compared to the traditional classroom where students usually did not have access to the internet, the smart classroom now provided students with more opportunities to access online resources. This led to an increase in students' scrutiny of English teachers, as students were more likely to notice when teachers made a mistake, which in turn could remind teachers that they were L2 English learners. Similar cases were reported by Frank in his lesson on British culture:

> One of my students delved deeply into how different philosophical ideas influence society … He even mentioned British conservatism and gave examples. However, other students disagreed, arguing that Brexit was an example of a more aggressive stance. I don't fully understand Brexit or the full political and economic logic behind it. While I found their arguments fascinating, it also made me realise how much I still must learn and made me feel a little insecure. (Frank, interview)

Unlike Taylor, who was explicitly challenged by students, Frank's insecurity arose internally and was not explicitly influenced by the smart classroom. Although being positioned as an insecure teacher is generally seen as negative, it also motivated Frank to pursue further learning beyond English itself. This situation exemplifies the concept of co-learning between teachers and students, where they learn from each other and collaboratively construct knowledge (Tai & Li, 2021). By embracing the idea of co-learning, teachers can relieve themselves from the pressure of always having the right answers and shift away from viewing themselves as the sole experts in the classroom (Tai & Wong, 2023). This arguably may alleviate the conflicting feeling perceived by Frank and allow him to renegotiate the self-position as an insecure teacher to a more relatable position with students.

The second reason participants identified themselves as insecure teachers was related to their language teaching environment. Students are quick learners in technology and often master technology better than their teachers. This led to both positive and negative outcomes. On the positive side, students assisted teachers with technological tasks, enhancing the overall learning environment (e.g., Rachel was taught by students how to upgrade Seewo and Frank was shown by students how to locate the speakers). On the other hand, students' advanced skills in using the technology prevented participants from monitoring their progress. In other words, the material affordance of the smart classroom created challenges in monitoring academic integrity and student engagement:

> Our smart classroom provides software to help teachers create exam questions. You can type in a Chinese keyword and the software will generate questions. Students can easily look up the answers in similar software. So technology is placing increasingly higher demands on us. Personally, I felt the risk of using this software. (Zack, interview)

> I used to grade the students' essays, but now I find myself grading ChatGPT's essays. However, you can only ask students if they used AI; you can't directly accuse them because you don't have concrete evidence. This situation makes me feel powerless as a teacher. (Taylor, interview)

From these quotes, participants indicated that their discomfort stemmed from the limited transparency (e.g., uncertainty about whether students had found answers online) and lack of digital accountability (e.g., lack of concrete evidence about students' use of AI) of the technologies within and beyond the smart classroom. A socio-material boundary was erected between participants and students, as the mutable virtual space enabled the ambiguity of students' online behaviour (Howard, 2023) and disengagement from homework (Kebritchi et al., 2017). In other words, the material agency of these technologies creates constraints in human interactions. Thus, teachers were displaced from explicit control over the classroom (Postma, 2012) and experienced sensations such as "feeling the risk" and "feeling powerless", which ultimately led to the positioning of "insecure English teachers". A similar finding was revealed by Howard (2023), who found that the materiality of online platforms that obscure the transparency of the authorship of students' work could evoke insecurity in teachers, leading to their negative identity construction as "disconnected teachers".

Summary

In summary, four salient identity positionings emerged among participants: two related to the affordances of the smart classroom - the language facilitator and the motivator - and two related to the constraints of the smart classroom - the language attrition sufferer and the insecure English teacher. The socio-material perspective highlights how teachers' identities are formed through the specific ways in which technologies and materials are designed, configured and used in practice. For example, it is not simply the presence of game templates that makes teachers language facilitators, nor is it teachers who independently create innovative classroom designs from scratch. Rather, it is the interaction between the different game templates available on the Seewo and teachers' intentions to select more interactive vocabulary templates that transforms them into language facilitators who elicit more students' L2 output. Similarly, the identity of English attrition sufferers emerges from the socio-material imbrication between participants and the constraints of overly simplistic teaching resources, together with institutional pressures to conform to materials such as curriculum standards.

However, in the face of the constraints of the smart classroom, participants are able to exercise their human agency, which sometimes helps to maintain their imagined identities.

Research Question 2 - Capital

The following sections address the RQ2 on how the L2 English teachers negotiate their capital in the smart classroom. Capital has been operationalised as a synonym for 'power' manifested in economic, cultural and social forms (Bourdieu, 2011). Cultural capital, the knowledge, values and appreciation of specific cultural forms, was frequently mentioned by participants. The analysis of data from all the instruments generated two sub-themes on capital: Ambivalent attitudes towards Chinese as a valuable linguistic capital, and use of existing capital as an affordance for the teaching of English, which will be addressed in turn in the following sections.

Ambivalent Attitudes towards Chinese as a Valuable Linguistic Capital

Participants faced a dilemma in their perception of Chinese as a valuable linguistic capital in the English classroom. On the one hand, all participants preferred to use English as the primary language of instruction – "*I try to use English as much as possible.*" (Frank, interview) – and to receive responses in English – "*I encourage them to answer questions in English. I'd rather they didn't answer in Chinese.*" (Taylor, interview). These quotes demonstrated participants' preference for English to be used by both teachers and students. When I further probed their attitudes towards Chinese, the devaluation of Chinese use during class became more salient:

> [When I hear students speak Chinese] I feel powerless. Speaking Chinese may be out of laziness or a desire to take the easy way out, or it may indicate that their ability to express themselves in English is limited. (Wendy, interview)

> Using Chinese may be a limitation or a habit for students. In an English class, speaking more English is certainly better because it is the opportunity for students to practice speaking for the test in *Gaokao* [national college admission exam]. (Zack, interview)

Participants perceived the use of Chinese as detrimental to English learning, labelling it as “powerless”, “laziness” or “taking the easy way out”. This negative perception is likely to result from the reduction in exposure to and practice with English when Chinese is used instead. The education system assigns a high level of symbolic capital to English (Bourdieu, 1991), which diminishes the perceived value of other languages on the global stage (Flynn, 2013). This prioritisation of English infiltrates the classroom, whereby any opportunity to learn English is seen as too valuable to be overshadowed by the use of Chinese, which is seen as less socially important.

Consequently, teachers who view English as possessing important capital demonstrate a strong commitment to using English for instruction and maximising English learning opportunities (Norton, 2016a), often without emphasising Chinese as a valuable linguistic resource. This phenomenon has been raised by Norton (2015) as a challenge for English teachers because, in the optimal situation, English teachers need to “harness the capital that students already have and use it as resources for learning” (p. 387). However, the invisible mechanisms of power exerted by university entrance exams and the broader education system have hindered teachers from achieving this goal. This represents a shift in research and pedagogical trends which may not yet have been widely adopted or acknowledged.

Nevertheless, although English use was considered more desirable, most participants admitted that the use of L1 was necessary for students in some circumstances, especially when the content was difficult, and the students were at a lower level of English proficiency. This acknowledgement highlights a practical approach to English teaching where the use of L1 can serve as a valuable scaffolding tool to facilitate comprehension and support learning:

> In classes where students generally have a weaker foundation [in English], many of them cannot understand when you speak English. So, in these classes, about 70% to 80% of the instruction is in Chinese. (Taylor, interview)

> I use Chinese to enhance efficiency. If terminologies are explained in English, many students cannot fully understand. (Rachel, interview)

> When students are really struggling to express themselves in English, they explain their ideas in Chinese. (Wendy, interview)

This finding is consistent with the previously discussed study by Zhang (2024), who found that students may revert to their L1 when they are uncertain about how to express their thoughts in English. Teachers' use of the L1 to explain difficult concepts further illustrates the translanguaging strategy of using the L1 to facilitate L2 development (Carstens, 2016). Chinese thus becomes a valuable form of linguistic capital that allows students who struggle to understand or express themselves in English to be more integrated into the classroom.

Interestingly, Wendy, who held the most negative attitude towards the use of Chinese in the classroom, deliberately relied on it for explanation and translation. During one observation, she asked students to explain the mechanism of traditional Chinese acupuncture. When a long silence ensued, she provided the answer in Chinese, "*针灸会产生一种物质来缓解疼痛*" (acupuncture creates substance in the body to release pains), and led students to translate into English. This act of switching back to Chinese was a sign of participants' seeing L1 as linguistic capital (Zhang, 2024), using it to address classroom silence and students' difficulties in formulating responses. Overall, the ambivalent attitudes towards Chinese as valuable capital were expressed by the participants.

Use of Existing Capital as an Affordance for the Teaching of English

In the process of L2 teachers investing in the smart classroom, participants encountered a series of challenges (e.g., determining the appropriate teaching pedagogy, motivating students to engage in class, and deciding what content should be included). Darvin and Norton (2016) suggest that L2 speakers could leverage their existing capital as an affordance to obtain more L2-mediated social opportunities. Participants in this study negotiated their existing cultural capital to guide their

English teaching. One type of capital mentioned by participants was their prior knowledge acquired from their educational background:

> During my undergraduate studies at a normal university, my English grammar teacher mentioned that while we study grammar rules, they are not strict standards and should be learned in the context of everyday usage … While I disagree somewhat and still teach students the necessary grammar terminology to ensure that they can clearly understand the basic rules, I also emphasise that what we learn as standard English may differ from the spoken language. So, students shouldn't be surprised by non-standard usage and shouldn't judge others' usage harshly. (Frank, interview)

> I took an L2 acquisition course at university and have noticed that many students experience L2 anxiety. This anxiety isn't entirely negative. With some encouragement and teaching strategies, L2 anxiety can have a positive impact on students' learning. (Taylor, interview)

These quotations suggest that Taylor and Frank have exercised their prior knowledge and experience learning English as a form of cultural capital to transform their teaching. Frank completed his undergraduate degree in English studies at a "normal university", where the courses were tailored for teacher preparation. Influenced by his university teacher, Frank developed an understanding that teaching should move away from strict adherence to grammar. This approach is now considered by many academics and practitioners to be more empowering compared to the context-detached grammar-translation method, which emphasizes memorisation, recitation, and strict adherence to grammar rules (Rao, 2013). For Taylor, she completed her master's in Applied Linguistics at a prestigious British university. As her quote suggests, her degree introduced her to theories of L2 acquisition, which she used to develop English teaching strategies such as applying the theory of L2 anxiety to improve students' English learning outcomes.

However, exercising existing capital for teaching did not always lead to positive investment. Taylor's cultural capital also created unsettling feelings for her English teaching:

> I took a course called English as a Global Language, which made me look at the language from a more open and diverse perspective, seeing it as a tool for communicating and expressing our views to the world, rather than a tool for doing well in exams. To be honest, this perspective diverges from the exam-oriented education, which sometimes makes me feel helpless or frustrated. Nevertheless, I still hold on to this belief. (Taylor, interview)

Taylor's belief in English as a tool for communication and expression rather than for examination was shaped by her experience of studying in Applied Linguistics courses and became part of her cultural capital. However, this form of cultural capital was not valued by the exam-oriented education system and was not embraced by many English teachers in the field. This reflected how the "value of an L2 speaker's cultural capital is subject to but not completely constrained by the ideologies of different groups or fields" (Norton, 2015, p. 380). Taylor's powerlessness and frustration could be interpreted as a sign that her cultural capital was subject to devaluation by the educational institutions in which she worked. However, her persistence in "holding on to this belief" was an example of how she mobilised her agency to resist the constraints imposed on her.

Summary

This section revealed participants' complex and ambivalent attitudes towards viewing Chinese as valuable capital in the English classroom. Participants' strong preference for the use of English could be explained by the higher level of symbolic capital that English brings to the classroom and the institutional pressure on teachers to prepare students for the exam, which drives teachers to maximise opportunities for learning English, even at the expense of using Chinese as a resource.

However, participants also acknowledged that Chinese could facilitate comprehension and increase classroom efficiency, especially for students with lower levels of English proficiency. The observation data revealed that teachers relied on the Chinese to explain difficult points, suggesting an inherent value of the L1.

Furthermore, participants used their educational background as cultural capital to inform their teaching strategies. Frank's contextualised approach to grammar and

Taylor's use of L2 acquisition theories to motivate students are examples of this. However, Taylor faced challenges in reconciling her ideology of English as a communication tool with the exam-focused education system, reflecting the devaluation of certain forms of cultural capital in the education system (Norton, 2015). Her perseverance in holding on to her beliefs further demonstrates how agency can sometimes resist the constraints imposed by the broader education system.

Research Question 3 - Ideology

The following sections address RQ3 on how English teachers negotiate ideologies, particularly language ideologies, in smart classrooms. Ideology has been operationalised as an umbrella term for the set of ideas constructed by those in power (Darvin & Norton). In terms of language ideologies, it refers to all language-related beliefs, perceptions, understandings and interpretations (Wang, 2020). The negotiation of compatible and conflicting ideologies transformed participants' investment and the system of control they perceived. Three sub-themes emerged from the data: English learning for communication, English learning for cultural exchange, and the ideology under exam-oriented English education.

English Learning for Communication

English learning for communication was explained by participants as the belief that English serves as an important tool that facilitates communication between people from different parts of the world:

> The purpose of learning English is primarily for daily communication and as an essential skill in social interactions … Whether you're working for a multinational company, dealing with foreign clients, or travelling to countries like Thailand or France, even if you don't speak Thai or French, knowing English allows you to communicate with most people. (Zack, interview)

> The main purpose of students learning a foreign language is to use it as a tool for communication and interaction. (Rachel, interview)

Participants' understanding of learning English for communication closely aligns with the ideology of English as a lingua Franca (ELF), referred to as "communication

in English between speakers with different L1s" (Seidlhofer, 2005, p. 339). Essentially, English often serves as a contact language between interlocutors who do not share the same L1 or culture, and for whom English is the default foreign language for communication (Seidlhofer, 2005). Galloway and Rose (2015) pointed out that English is the world's foremost global lingua franca, which may explain why participants believed that learning English could facilitate global communication (e.g., communicating with foreign clients) and was highly valued as linguistic capital.

One distinctive phenomenon resulting from ELF was that new codes of English are often used for interaction among English speakers (Elder & Davies, 2006). These code are not necessarily "Standard English" but are usually based on "Standard English" norms (whether there is a Standard English is another discourse and beyond the scope of this paper) (Elder & Davies, 2006). This means that strict adherence to "Standard English" during communication becomes less important, allowing L2 speakers to utilise their multilingual repertoires. Three participants exhibited such an ELF phenomenon in their teaching by moving away from judging students' English accents—whether British, American, or Chinglish—as long as the communicative purpose was achieved:

> I often tell my students that although we are learning Standard English, the real communicative contexts might deviate. Someone's grammar or accent isn't the one you learned doesn't mean you can't understand them. The key is comprehension. (Frank, interview)

> I now believe that having an accent is not an issue. If it serves the purpose of effective communication, it's perfectly acceptable. (Wendy, interview)

> I don't impose accent restrictions on my students; English is a universal language, and I don't think there is any need to insist on British or American accents. (Taylor, interview)

These reflections illustrate how the ideology of ELF and its associated beliefs about accents influence L2 speakers' communicative practices in the classroom, such

as embracing accented English (Darvin & Norton, 2015). This finding contrasts with Yuan's (2023) study of Chinese university students, which revealed that the ideology of the superiority of Standard English is so deeply embedded in the education system that both teachers and students emphasised "native" accent as an important form of capital and part of an imagined identity to which they aspire. Rao (2013) suggests that a move away from the ideology of Standard English, starting with L2 English teachers, could be seen as a positive development. It indicates a growing critical awareness of sociolinguistic realities and an increased tolerance for different pronunciations or occasional violations of the rules of the language.

English Learning for Cultural Exchange

There is a widespread ideology that culture and language are interconnected with cultural meanings embedded in linguistic signs, and different language speakers have distinct ways of thinking and cultural worldviews (Kramsch, 2014a). Thus, the teaching of a foreign language could be seen as the process of facilitating scenarios of linguistic and cultural exchange across the globe (Kramsch, 2014b). Participants embraced this ideology by arguing that English learning was aimed at cultural exchange. Such an exchange is two-way: learning English allows students to learn from other cultures: *Through English, people can experience different cultures and learn from the different discourses behind* (Frank, interview). On the other hand, it allows students to spread Chinese culture to the world:

> The government's intention in maintaining the emphasis on English in the college entrance exam is to enable us to share Chinese culture with the world. English is an important medium for this. (Wendy, interview）

> Learning English now is more about telling Chinese stories, using English to share China's narrative has now been emphasised in the education system. (Rachel, interview)

The circulated ideology of English learning for spreading Chinese culture was promoted in a top-down process, initiated by the government and passed down to

individual levels. This initiative likely stemmed from concerns about students gradually losing touch with Chinese language and culture, prompting the Chinese government to reassess the balance between Chinese and English. Inspired by the Global Englishes ideology, the government encouraged the integration of Chinese elements into English learning environments (Fang, 2018). Simultaneously, L2 teachers were required to develop an approach that prepares students to use English while maintaining a historical and cultural awareness of their own language (Siemund & Bonnet, 2018).

Influenced by the ideology of learning English to share Chinese culture, participants have increasingly incorporated Chinese elements into their English teaching practices. For example, as noted in Taylor's diary, she played a video of "The Butterfly Lovers", one of China's most famous orchestral works, to introduce an English discussion on country music. During her teaching, she also encouraged students to consider how music could serve as a universal language and cultural medium. Similarly, during Wendy's lesson on traditional medicine, she focused on Chinese acupuncture, guiding students on how to explain different types of Chinese acupuncture to foreigners. Thus, although these lessons are primarily delivered in English, Chinese culture is incorporated as content or theme, showcasing how ideology can mediate L2 speakers' classroom practices (Darvin & Norton, 2015).

Ideologies under Exam-oriented English Education

The final sub-theme on ideology relates to exam-oriented English education, which revolves around preparing students to achieve higher grades in exams (Hu & West, 2015). Ideologies under exam-oriented English education such as *Standard English ideologies* and *Native-Speakerism* led participants to re-examine the practicality of innovative approaches to teaching English (J. Liu, 2018), in which they push back (or not) with their own counter-ideologies.

As discussed in previous sections, the affordances of the smart classroom have enabled participants to renegotiate their roles as language facilitators, usually accompanied by innovative classroom design to engage students. However, this positive identity and these classroom practices were challenged by the exam-oriented

education system that limited teachers' freedom to develop content that deviated from the textbooks (J. Liu, 2018). This contradicted the previously discussed ideology of *learning English for communication/cultural exchange*. Thus, participants confronted the dilemma of deciding what and how to teach:

> The content we teach is extensive, and the exams are very detailed, which is a practical reality. I have had to reduce many interesting activities to spend more time thoroughly covering the knowledge points. I feel the pressure of this exam-oriented education. (Frank, interview)

> When I first started teaching English, I was very proactive in encouraging students through innovative methods. However, I have now sacrificed some of the so-called "interesting" teaching time to focus on exams due to institutional pressures. (Rachel, interview)

Rachel and Frank found themselves navigating the complex power dynamics between their desire to implement novel teaching practices and the restrictive social structures of the exam-oriented education system, which confines the teaching approaches (Darvin & Norton, 2023). As a result, they adapted their innovative practices to fit in with routine testing, illustrating the criticism that exam-oriented education stifles creativity in both teachers and learners (Ghanizadeh & Jahedizadeh, 2016). Notably, all participants identified lack of time as a significant factor in their partial or total conformity to the exam-oriented education system. Wendy provided a justification:

> [After the double reduction policy] Our class hours are curtailed … The total numbers of classes are also curtailed. We must balance the textbook, exercises, and regular exam reviews in this reduced time. If teachers focus on what we call "interesting" activities, we won't see immediate results in exams. (Wendy, interview)

Exam-oriented education is a global phenomenon (Aleroud et al., 2020), but in China, it uniquely intersects with the educational reform of the *Double Reduction Policy*. This policy aims to "reduce students' homework burden and off-campus

training burden" (Xue & Li, 2023, p. 787). On the face of it, it appears to challenge exam-oriented education by prohibiting schools from providing additional after-school exam training and releasing students from heavy schoolwork. However, without systemic changes to the exam structure, classroom practices remain largely unchanged (Yan, 2015). Consequently, teachers, like all the participants in this study, are faced with the challenge of having less time but the same amount of content to cover, forcing them to reassess the value of developing engaging content. This finding echoes Stranger–Johannessen and Norton's (2017) research on language teachers' investment, which revealed that ideological challenges related to exam-oriented education hindered language teachers from fully investing in innovative digital landscapes for language teaching. Teachers questioned the practicality of these landscape as it was not incorporated into formal exams, exemplifying how institutional structures could drive ideology transformation.

In the face of such ideological challenges, participants responded in different ways in terms of how they exercised their agency. For example, Zack conformed to institutional expectations by focusing his teaching on test-taking skills and feedback based on results. This could be framed as a discussion of self-efficacy, referred to as the locus of control exercised by the individual (Bandura, 1997). Through this lens, Zack's compliance is consistent with Ruohotie-Lyhty's (2011) findings that individuals with a low sense of self-efficacy (a core aspect of agency) tend to adhere more closely to external norms and authority in their teaching roles.

Conversely, a smaller number of teachers exercised their agency to reconcile the conflicting ideologies:

> I don't agree with the exam-oriented approach, as I believe English is a tool for communication, not just for passing exams. In my teaching, I consciously avoid the exam-oriented method and only use it when there is a teacher inspection. (Taylor, interview)

Taylor was the only participant who demonstrated how teachers with high levels of self-efficacy can resist established practices and norms (Ruohotie-Lyhty, 2011). By exercising her agency, Taylor maintained her preferred teaching methods and navigated institutional pressures by adapting her practices only during inspections. This approach allowed her to adhere to her ideology of teaching English for communication, thereby reinforcing her empowered identity as a language facilitator (Norton, 2013).

Summary

Three ideologies emerged from the data: English learning for communication, English learning for cultural exchange, and the ideology under exam-oriented education. Participants who held the view of learning English for communication interpreted English as a tool that facilitates communication between people from different linguistic backgrounds, aligning with the ideology of English as a lingua franca. Under the influence of this ideology, some participants emphasised effective communication over adherence to Standard English norms, moving away from judging students' accents to encouraging students to use their multilingual repertoires.

Participants also embraced the ideology of learning English as a means of two-way cultural exchange. English was the medium through which Chinese speakers could not only learn from other cultures but also share Chinese culture with the world. This ideology was passed on by the government and transformed participants' teaching practices to include more Chinese elements in their lessons.

However, these more inclusive and pragmatic ideologies contrast with the ideologies under exam-oriented education such as Standard English ideology. Constrained by the institutional emphasis on exams and the limited course time imposed by the Double Reduction policy, participants faced a dilemma in designing lessons, often questioning the practicality of innovative teaching approaches. Most participants responded to this dilemma by focusing on test-taking skills and assessment. Taylor was the only one with a high level of self-efficacy to maintain a communicative approach to teaching English, underpinning the counter-ideology of learning English for communication.

L2 English Teachers' Investment – Putting it All Together

This section brings together the constructs of identity, capital and ideology to provide a holistic view of L2 English teachers' investment in the smart classroom.

As indicated by Darvin and Norton (2015), L2 speakers may invest in particular practices when they perceive their existing capital as an affordance to their learning or teaching, which subsequently influences identity construction. Participants like Frank and Taylor leverage their existing cultural capital (prior educational experience) as an affordance to design content and implement teaching strategies. These practices positively influenced their identity construction (Darvin & Norton, 2015), transforming them into motivators who encourage students to develop self-directed language learning skills.

The relationship between capital and identity is also mediated by participants' ideology. For example, Taylor's ideology of English learning for communication was shaped by her study experience in an Applied Linguistics course (her existing cultural capital). This ideology informed her classroom practice, leading her to promote L2 output for English-speaking practice and positioning her as a language facilitator.

However, certain ideologies can obscure power structures that devalue specific forms of symbolic capital (Lado & Quijano, 2020). The ideologies underpinning exam-oriented education have emphasised Standard English and standardised learning, contradicting the principles of Global Englishes. Thus, Taylor's cultural capital was challenged, requiring her to exercise her agency to reclaim the legitimacy of her cultural capital under institutional pressure.

Similar negative effects, driven by the ideologies of exam-oriented education, could be found in Zack and Wendy's practices of prioritising curriculum standards and administrative duties over innovative classroom design. This act has challenged their identities as language facilitators and potentially conceded to their positioning as language attrition sufferers with no time for their own English learning.

Overall, the interplay between identity, capital, and ideology is complex and multifaceted. Participants' language investment was influenced by this interplay, which sometimes supported (e.g., the ideology of English learning for communication

and identity construction as language facilitators) and sometimes opposed each other (e.g., the ideology of English for communication versus exam-oriented education). Power dynamics and learner agency further mediated L2 teachers' investment, with some participants conforming to institutional pressures and assigned identities, while others exercised their agency to reshape power relations and maintain their imagined identity or assert more positive positionings. The socio-material lens on identity further elaborated on the role of materials in shaping identity construction and their broader impact on teachers' overall investment in smart classrooms.

CHAPTER 5: CONCLUSION

This chapter summarises the main findings of the research, highlights its strengths and limitations, and suggests important areas for future research. The chapter concludes by outlining the implications of the research findings for pedagogy and practice.

Key findings

Following Norton's (2015) model of investment, this study explores the socially and materially situated English teaching and learning of five L2 English teachers in the smart classroom. Through a qualitative design involving the background questionnaire, classroom observation, diaries, and the semi-structured interview, it unpacked the agentive and complex ways in which the participants negotiated their identities, capital and ideologies, and mobilised their agency to comply/resist assigned identity and institutional constraints.

Identity

This study revealed identity positions that emerged from the socio-material imbrication, showing that the material enactment of the smart classroom was not a neutral process, but one that had transformative effects on L2 English teachers' identity construction. The affordance of the smart classroom with high-tech functionality enabled participants to positively position themselves as language facilitators and motivators who actively facilitated and monitored students' English learning through innovative designs such as gaming templates. However, the smart classroom also led to feelings of powerlessness and ambivalence as participants negotiated their digital capacity and identities. The limited English resources provided, together with being challenged in their use of English due to increased student scrutiny, have negatively positioned participants as language attrition sufferers. At the same time, the lack of control over the students' learning due to limited transparency and digital accountability led participants to experience further insecurity.

Capital

In this research, participants experienced dilemmas in investing in L1 Chinese as valuable linguistic capital. Influenced by the institutional pressure on preparing students for exams, participants explicitly labelled Chinese as unwanted linguistic capital that hindered students from maximising English practice. However, participants also acknowledged that Chinese plays a facilitative role, enhancing comprehension and efficiency when the content is too difficult for students. Observation data revealed that Wendy frequently resorted to Chinese for translation, treating it as an important asset in classroom practice.

Participants also leveraged their existing capital as an affordance to inform teaching. Cultural capital, such as prior educational background and experience, has transformed participants' teaching strategies and activity design. However, such existing capital can also be challenged due to its ideological confrontation with the exam-oriented education system, requiring participants to exercise agency to maintain their beliefs and resist the constraints imposed.

Ideology

The findings reveal three key ideologies that explain participants' classroom practices and their systemic patterns of control. Language ideologies of English learning for communication and cultural exchange have shifted participants away from strict adherence to "standard" accents and grammar. This transformation has encouraged them to adopt a more inclusive approach to teaching, drawing on students' multilingual repertoires to enrich the learning experience.

However, conflicting ideologies within the exam-oriented education system challenged these progressive ideologies, leading to tensions between individual agency and the social structure imposed by the field (Darvin & Norton, 2015). Ideologies such as Standard English confined participants to routine teaching practices, influencing their perceptions of students' L1 and their control over teaching methods. Faced with the dilemma of navigating these conflicting ideologies, participants' agency to either resist or comply with institutional expectations became crucial in determining their investment in the smart classroom.

Study Strengths

Three strengths of this study have been identified: Firstly, unlike most language investment research, which predominantly adopts a poststructural perspective to explore identity in interpersonal interactions, this study adds a socio-material lens to examine identity as a relational phenomenon co-constructed by human and non-human entities (Howard, 2023). This approach highlights the active role that smart classroom materials play in the construction of L2 teachers' identities.

Secondly, most research on language investment has focused on L2 learners or, in limited cases, L1 teachers. This study extends the existing population to include L2 teachers who are simultaneously L2 learners and language teachers. Their dual roles equip them with different patterns of control and ideologies, which consequently transform their teaching practices and reveal distinct English investment in the smart classroom.

Thirdly, this research triangulates the data through multiple lenses. Findings from the questionnaire, diaries and semi-structured interviews are complemented by observation, which captures data that participants displayed but did not subjectively disclose. This methodological approach facilitates a comprehensive understanding of the phenomena under study.

Limitations

Although carefully designed, this study has some limitations that need to be addressed in future research. Firstly, the small sample size and the non-probability sampling method limit the probability of statistical analysis and the generalisability of the findings beyond the sample. As all participants identified their students as having average or above-average proficiency, the sample thus lacks the perspectives of L2 English teachers with low-performing students. This is significant because, as the findings show, students' English proficiency influenced teachers' perceptions of L1 capital and subsequently their teaching practices. Furthermore, the convenience sampling method resulted in the inclusion of two participants with whom I have a personal friendship, which may have influenced how they framed their responses due to their familiarity with me.

Secondly, despite efforts to increase the rigour of the research, my identity as an international student researching teachers' classroom practices and my focus on the socio-material approach to identity construction in the smart classroom may have led participants to emphasise technology in their responses. Social desirability bias, where participants represent the social context, the smart classroom, in a socially acceptable manner (Bergen & Labonté, 2020), may also have influenced the research. Participants were aware that they were representing Chinese smart classrooms in an international study that may be published, which may have led them to frame their responses more positively.

The lack of longitudinal data is another limitation of this research. As previously discussed, teachers' investment in the smart classroom is a dynamic process with ongoing transformations. This may be better captured through a longitudinal design as changes may become more salient over time. Additionally, this study primarily relied on teachers' perceptions of their students' identities rather than directly measuring students' identities. A longitudinal design would afford researchers more opportunities to incorporate students' perspectives and identify potential overlaps and differences between students' and L2 English teachers' identity construction in the smart classroom.

Areas for Future Research

While this research innovatively adopts a socio-material approach to language investment research, several areas remain unexplored, highlighting opportunities for future investigation. Firstly, this study primarily applies the socio-material approach to the identity component of the investment model, guided by the socio-material narrative analytical approach to identity (e.g., Symon & Pritchard, 2015). Future research could explore whether this approach can also be applied to the capital and ideology components of the investment model, potentially yielding interesting and innovative results.

Secondly, future research could involve larger sample sizes with a more diverse population, ideally recruiting L2 teachers who work with students of varying ability levels and who themselves have different levels of computer literacy. Specifically,

measures of computer literacy and confidence during recruitment are recommended to examine how adept teachers with varying levels of computer literacy are at using different technologies and how this impacts their identities, the capital they possess, and the ideologies they uphold. Additionally, the inclusion of L2 teachers who teach languages other than English, where resources may be less available, would provide further insights.

Finally, a longitudinal approach following L2 teachers over an extended period is recommended. This would better capture the evolving nature of identity, capital, and ideology, revealing transformations that may become more apparent over time. Furthermore, it allows researchers to uncover changes that participants do not explicitly disclose, shedding light on hidden aspects of language investment in the smart classroom.

Pedagogical Implications

This study has potential pedagogical implications for both L2 English teachers in smart classrooms and education policymakers in China and more broadly.

Firstly, L2 teachers' insecurity and negative positioning as insecure English teachers stems from the constraints of the smart classroom, where students have developed advanced technology learning skills that challenge teachers' relative positions as 'experts'. However, as exemplified in Frank's case, teachers are also learners who can learn from students and collaboratively construct knowledge (Tai & Li, 2021). L2 teachers could therefore be advised to develop an awareness of co-learning, which could potentially relieve the pressure of always having the right answers and move away from seeing themselves as the sole knowledgeable authority in the classroom (Tai & Wong, 2023). This is particularly important in today's technologically mediated classrooms, where English teachers have ample opportunities to engage with smart devices and use these technologies to renegotiate their roles and become more relatable to students.

Secondly, the findings suggest that L1 is a valuable linguistic capital for students' L2 learning. While the use of English is usually emphasised in the classroom, L2 teachers may find it beneficial to develop a critical understanding of students' existing

linguistic and cultural capital and use these resources in L2 teaching and content design (Katie & Karathanos, 2009).

For policymakers, the detrimental effects of exam-oriented education on L2 teachers' identity construction and the ideological challenges they face are evident. Although steps have been taken to revise the current educational system, further efforts are needed. Promoting more inclusive English ideologies, such as *Global Englishes,* from the policy level may alleviate these ideological dilemmas and support L2 teachers' investment in the classroom.

Finally, in the face of the obscurity and lack of digital accountability brought by the smart classroom, the demand for language teachers' technical skills is increasing. Policymakers are advised to take steps, such as offering teacher education programs, to prepare L2 English teachers for these challenges. This may help transform L2 teachers from feeling insecure and powerless to achieving a systematic pattern of control within the educational environment.

In conclusion, by employing Norton's model of investment, this research provides comprehensive insights into how L2 teachers construct their identities, perceive and exercise their own and their students' capitals, and how language ideologies drive and underpin their classroom practices. This study addresses the current research gap on investment by incorporating a socio-material approach to explore identity and focusing on the underexplored population of L2 teachers. The findings suggest promising areas for future research and offer pedagogical implications for both L2 teachers and policymakers in the context of smart classrooms and beyond.

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APPENDICES

Appendix 1: Background Questionnaire

1. 姓名 Name

2. 您父亲的职业 (如已退休、请填写他曾经的职业) Your father's occupation (if retired, please provide his former occupation)

3. 您母亲的职业 Your mother's occupation (if retired, please provide her former occupation)

4. 您父亲的最高文化程度 The highest level of education of your father

- ☐ 研究生及以上 (Master's degree and higher)
- ☐ 本科 (Bachelor's degree)
- ☐ 大专或中专 (community colleges award certificates and associate degrees)
- ☐ 高中及以下 (High school's and below)

5. 您母亲的最高文化程度 The highest level of education of your mother

- ☐ 研究生及以上 (Master's degree and higher)
- ☐ 本科 (Bachelor's degree)
- ☐ 大专或中专 (community colleges award certificates and associate degrees)

- [ ] 高中及以下 (High school's and below)

6. 您的最高文化程度 Your highest level of education

- [ ] 研究生及以上 (Master's degree and higher)
- [ ] 本科 (Bachelor's degree)
- [ ] 大专或中专 (community colleges award certificates and associate degrees)
- [ ] 高中及以下 (High school's and below)

7. 您目前的薪资水平/月 (税前) Your income level/month (before tax)

- [ ] 30K 以上 (More than 30K)
- [ ] 20-25K (20-25K)
- [ ] 15-20K 不包括 20K (15-25K, 20K not included)
- [ ] 10-15K 不包括 15K (10-15K, 10K not included)
- [ ] 10K 以下 (Less than 10K)
- [ ] 不方便透露 (Prefer not to say)

8. 您是否有过留学的经历？如果有，请提供您留学的时长和国家。如果没有，请回答'无'。

Do you have any experience studying abroad? If yes, please provide the duration and specific time of your study abroad. If no, please answer 'None'.

9. 您现在授课年级 What grade(s) are you currently teaching?

- [ ] 七年级 Year 7
- [ ] 八年级 Year 8
- [ ] 九年级 Year 9
- [ ] 十年级 Year 10
- [ ] 十一年级 Year 11
- [ ] 十二年级 Year 12

10. 您的教学时常 (兼职与实习不计入时常)

Your teaching duration (part-time and internship hours are not included)

- [ ] 十年以上 (more than 10 years)
- [ ] 五年到十年 (5-10 years)
- [ ] 三年到五年 (3-5 years)
- [ ] 两年 (2 years)
- [ ] 一年及以下 (1 year and below)

11. 相比于同年龄阶段的学生，您觉得您所教的学生的英语水平/基础：请基于联考成绩回答。

Compared to students of the same age, how do you feel about the English level/foundation of the students you teach? Please base your answer on the average score of students in the city's unified examination.

- [ ] 高于平均水平 Above average
- [ ] 等同于平均水平 Average
- [ ] 低于平均水平 Below average

Appendix 2: Prompts for the Diary

请详细记录您的教学日记。 Please keep a detailed teaching diary.

您的日记应该包括以下几个方面：Your diary should cover the following areas:

Goals/Objectives 目标/目的:

1. What specific goals or objectives are you aiming to achieve?
2. 你希望实现哪些具体的教学目标？

Personal Reflection 个人评价/反思：

- Share your personal views or opinions about the class as a whole.
- 分享你对课堂的总体评价或反思。

Comments on Activities: 对活动的评论：

- Reflect on the activities you have engaged in. What are your thoughts and feedback on these experiences?
- 回顾你课上的活动，你有什么想法和反馈？

Challenges/Mistakes: 挑战/错误：

- What obstacles, errors or mistakes have you encountered?
- 你遇到了哪些障碍或犯了哪些错误？

Successes: 亮点:

- Highlight your achievements and successes. How did these accomplishments contribute to your goals?
- 写出你课堂的亮点。这些亮点如何助你实现目标？

Technological tools used in your teaching process: 在教学过程中使用的技术工具：

- What technological tools have you used in your teaching? What was your experience with these tools?
- 你在教学中使用了哪些技术工具？使用这些工具的经历如何？

如果部分之间有重叠，不需要重复赘述。

Where there is overlap between sections, it is not necessary to repeat.

Appendix 3: Interview Protocol

Interview Questions	**Prompts and Probes**
Smart Classroom: 1. Could you introduce the design of the smart classroom? 请问教室的布局是什么样的？	
2. How do you feel about using the XXX? (the specific design he/she is mentioning) 你觉得使用 xxx 的体验怎么样呢?	Why? 为什么？
3. What do you think is the purposes/functionality of XXX technologies and objects? 你觉得使用 XXX 的目的或者功能是什么呢?)	How were they used in daily operational practices? 他们在平时是怎么被使用的？
4. Which part do you like about the XXX? Which part do you dislike? XXX 的哪一部分你是比较喜欢的? 哪一部分你不喜欢呢?	
5. If you had the chance to change the technologies and objects in the smart classroom, what would you do? 如果给你个机会去改变课堂用到的电子设备或者说物品，你会改变什么呢?	
6. How often and in what ways do you use technologies for searching information or learning materials? 你平时会上网或者使用学习平台去搜索信息或学习材料？如果会的话用的是什么呢？你怎么使用他的呢?	

Online Diary:	
1. (Present a particular diary) Why are you putting them there? 为什么你提到…?	What makes you feel in this way? 是什么让你这么想？
English teaching/learning trajectory:	
1. How do you define yourself? 在课堂中，你是怎么给自己定位/定义自己的呢?	Why? 为什么？
2. Why language(s) do you use in class and why? 在课堂上你一般用什么语言教学?为什么?	How do you feel about students using Chinese in the classroom? 你怎么看待学生在课堂上用中文？
3. Can you identify a moment when you feel successful in your teaching? 你可以分享一个你觉得你的教学很成功/或者带来成就感的时刻吗?	
4. Can you identify a moment when you feel unsuccessful in your teaching? 你可以分享一个你觉得你的教学受挫、或者有点失败的时刻吗?	How do you cope with this situation, Have somebody/technologies helped you with this? 你是如何应对这种情况的？有人或者科技帮助你解决了这个问题吗？
5. How have your past educational or study abroad experiences influenced your teaching? This can include both your beliefs and practices. 你的过去教育或留学经历对你的教学有什么影响吗？这可以包括思想观念上的影响，也可以包括具体实践上的影响。	
Reflection:	

1. What time, efforts have you devoted to learning English before and now? (informal learning is included) 你每天会花多少时间学英语？教书前后前后有变化吗？非正式学习时间也算入。	
2. What time, efforts have you devoted to preparing your lesson before and now? 你每天会花多少时间备课?	Why? Did this change during your teaching career? If yes, why? 为什么？这个花的时间在你教书过程中有变化吗？如果有，为什么？
3. How do digital technologies change your English learning attitudes/teaching? 科技如何改变你对英语学习的态度或教学方法？	
4. How do technology/objects shape your aspiration for the future? 科技或者教材这些非科技教学资料有改变你对未来的期望吗?	
5. What do you think is the goal of students learning English? 学生学习英语的最终目的是什么?	
6. To what extent do you think you are a competent English teacher before and now? 您认为自己以前和现在在多大程度上是一名称职的英语教师？	
7. Do you have anything to add? 你有什么要补充的吗？	

Appendix 4: Interview Transcript Excerpt and Translation

Frank's Transcript Excerpt and Translation:

Interviewer
课堂上您一般会用什么语言教学呢？

Frank
我两个班的情况不太一样，有一个班的同学他们班纪律会稍微好一些，能力也会比较强，那我可能会尽量多的使用英语，除非讲到一些比较常规化的事情，比如说一些琐碎的这个学习安排的事情，除此之外还是都是用英文来进行。但是另外一个班，他们班可能比较调皮好动一些，然后有的个别同学可能基础不是特别好，他们有时候比较难跟上我用英文讲的东西，那我用中文就会比较多。

Interviewer
好的，那学校或者您自己有任何语言使用上的要求吗？

Frank
我们是坚持学生课上发言必须要用英语回答。

Interviewer
好。那如果学生有答不上来的情况下，那会怎么办呢？

Frank
同学他答不上来，可能有几种情况，有一些可能比如说课上这个注意力不是特别集中没有跟上，那可能问到他问题他会一下不知道讲到哪一部分了，这一部分同学的话就是我点他提示一下他，就是你要弄清楚自己在做什么，要跟上了，然后让他坐下，然后让他旁边同学回答这个问题，然后还有同学可能是基础比较薄弱一些的，他一下子想不出来那个句子该怎么说，可能我就会给他一些关键词提示他，或者是比如说可能是跟课本上内容贴合很紧密的，我就提示他，比如说看课本中哪一段能不能找到关键信息？然后还有可能就是确实是问题比较难，就是可能确实是真的是一下子也想不出来怎么回答的，那这个时候我就停下来，可能让大家一起来讨论。

Interviewer
那您怎么看待学生在课堂使用中文这个行为呢？

Frank
有一个班同学会语码转换，就是中英文夹杂。不过我对这一方面，其实就是他只要不是全中文，我觉得我还是比较能接受的，这可能是他平时使用语言一个习惯，而且他语码转换，我觉得大家都能 get 到他说的意思，我觉得交际目的能够达成，我觉得我也可以接受，但是如果他可能举完手上来一下子就开始说中文，我可能就会提醒他 English，please。

Interviewer
好的，了解。然后那您怎么看待英语口音这个话题呢？

Frank
口音这一块，我觉得好像目前还好，因为我们对学生要求只是基本的把每个音发准确就行了。至于你可能真正谈到说是非常地道的语音语调，可能是一个稍微要求高点、并不是可以强行的要求。而且现在班上的同学我感觉他们的口音还没有真的进入到一个去专门模仿和刻意的去训练的这样一环节。我觉得总之交际的目的达到了，好像也不用再去死求一个这个口音的问题。

Interviewer
那您可以分享一个您觉得教学比较成功的时刻吗？或者就是您比较有成就感，也不一定是教学，就是当英语老师的过程吧。

Frank
突然一下想起来的，就是可能我刚刚跟您聊到的就是班上有同学一下子提到了英国的保守主义这个点，我觉得后来的讨论还挺成功的，就是有一些能力比较强的小朋友可能听到我给的这个例子之后，他们也能想到一些事情，就是我觉得就是后来大家讨论起来之后都觉得英语就是和我们现实生活中联系在一起之后这种感觉, 我还是挺享受的。

Interviewer
那跟这个对比的有没有哪个时候感觉稍微有点挫败或者失败呢？

Frank
我觉得这个还挺多的，一下子能想起来很多，主要是集中在就是我刚刚提到的可能小朋友比较活泼好动的那个班级上啊。因为其实不管是刚入学还是一直到现在，我坚持的一个底线我告诉他们就是 respect others，我说 respect 这个词虽然很简单，但它有很多内涵，它包括 Listen carefully. Do not interrupt. 以及就是 respect differences，就是接受你和人家想的不一样的地方，不要轻易地否定别人。然后最重要的一点，就是 value others' work，就是珍视别人的工作努

力。为什么我特别想强调这一点呢？就是因为我们现在每天都要做这个值日汇报，但是我就会发现他们班的很多小朋友就是在别人说的时候完全的不在意，我觉得这已经跳出了就是你是否认真听讲的这样的范围了。我觉得好像他们对于别人在学习英语然后并且分享自己所知所闻的所做这个工作上他们并不重视。以及包括可能我觉得有时候我付出的努力也没有被他们认真对待，就我可能认真准备的课，他们可能并不会太去认真地参与。所以在这一点上我可能在那班花了蛮多功夫的，但是当然也是这个年纪孩子的特点，就是他们可能确实是精力旺盛，然后可能这个共情的能力还没有发展起来，所以经常会感觉有点气馁。

Interviewer
嗯。那您过去的教育经就是教育经历或者留学经历，有对您的教学产生任何影响吗？可以是思想观念上的，也可以是具体实践上的。

Frank
嗯，我觉得是有的，像我在上师范大学本科的时候，当时我们学英语语法，我们的英语语法老师跟我们提过一点，他说就是我们现在虽然去研究这些 rules，但他说这些 rules 它并不是一个严格的标准，具体还是要看日常使用。他觉得最重要的语法是为了 communication 服务的，所以有 rules 就有例外，所以他说就有时候我们去深究 rules 没有太多的意义。然后就是说提到英语老师不需要给学生讲太多的这种很专业性的语法术语，或者是条条框框。而且最重要的是让学生知道就是书面使用的语法和你真正口语表达中的语法可能还是不太一样。其实我还可能稍微有一点不认同，因为就是一些语法术语如果不和学生讲的话，我们后面提到这个东西，没有明确的东西去指代他，可能学生有时候还是会弄不清，所以该讲的术语我还是在讲的啊。不过我的一个态度确实也是，我经常是会跟学生说，就是我们现在学的这个虽然说是 standard English，但是你们知道就是口语中也会有很多其他用法，那你们遇到的不要惊讶，不要觉得别人就是错了。就并不是说他语法错就听不懂了，只是说可能他没有那么的准确，可能容易引起一些这个误会，误解，不过你听懂了就行了。还有说包括你自己说话的过程中，你不要太担心，害怕各种语法错误。我说最重要的还是 communication，就是你要想办法把自己意识的传达准确，我觉得可能比你一直在想语法，然后说句子说得特别慢，还会卡壳要稍微好一些。

English Translation
Interviewer
What language do you generally use for teaching in class?

Frank

The situation varies between my two classes. In one class, the students are more disciplined and proficient in English, so I tend to use English as much as possible, except for discussing routine matters like minor administrative details. Other than that, I primarily use English. However, in the other class, the students are more undisciplined, and some have weaker English foundations, making it difficult for them to follow along in English. Therefore, I use more Chinese in that class.

Interviewer
Alright, do the school or you personally have any language use policy?

Frank
Our school insist that students must answer in English.

Interviewer
Okay. What do you do if a student cannot answer?

Frank
There are a few scenarios. Some students might not be paying attention in class, so when I ask them a question, they don' know where we are. For these students, I give them a hint to focus on what they're doing and follow along, then have them sit down and let another student answer. For students with weaker English skills who can't come up with a sentence, I might give them some keywords or direct them to specific parts of the textbook to find the answer. If the question is still too difficult to answer, I will stop and initiate a class discussion.

Interviewer
What do you think about students using Chinese in class?

Frank
In one of my classes, students often code-switch between Chinese and English. As long as they don't speak entirely in Chinese, I find it acceptable because it's part of their language use strategies, and everyone can understand their meaning. The communicative purpose is achieved. However, if a student raises their hand and starts speaking entirely in Chinese, I will remind them to speak in English.

Interviewer
Got it. How do you think about English accents?

Frank

Regarding accents, it's not a major issue at the moment for students. We only require students to pronounce each sound correctly. Achieving a native-like accent is a higher standard and not something we can enforce. Currently, the students haven't reached the stage where they specifically imitate or train their accents. As long as they achieve communicative goals, there is no need to overly focus on accents.

Interviewer
Can you share a successful teaching moment or a fulfilling experience as an English teacher?

Frank
One moment that comes to mind is when a student brought up Conservatism during a class discussion on the UK culture. The ensuing discussion was quite successful. Some of the high-achieving students, after hearing my example, could think of related ideas. I enjoyed seeing how English connected with real-life topics in our discussions.

Interviewer
In contrast, do you recall any moments of frustration or failure?

Frank
There have been quite a few, mostly with the more undisciplined class. Since the start of the term, I have emphasised the importance of respect, explaining that respect involves listening carefully, not interrupting, accepting differences, and valuing others' work. Despite this, I have noticed that many students in this class don't pay attention when others speak, indicating a lack of respect for their peers' efforts in learning and sharing in English. Sometimes I feel my efforts are not valued by them either, as they don't actively participate despite my preparations. This often leaves me feeling disheartened, although I understand it is typical for children at this age to be naughty and in the process of developing empathy.

Interviewer
Have your educational or study abroad experiences influenced your teaching? It could be ideology or practices.

Frank
Yes, they have. During my undergraduate studies at a normal university, my English grammar teacher mentioned that while we study grammar rules, they are not strict standards and should be learned in the context of everyday usage. The main purpose of grammar is to facilitate communication, so there are always exceptions to the rules.

He suggested that there was little point in delving too deeply into grammar rules. He also advised against overwhelming students with technical grammar terms, and to focus instead on practical usage. While I disagree somewhat and still teach students the necessary grammar terminology to ensure that they can clearly understand the basic rules, I also emphasise that what we learn as standard English may differ from the spoken language. So students shouldn't be surprised by non-standard usage and shouldn't judge others' usage harshly. The key should be effective communication, conveying meaning clearly, rather than obsessing over perfect grammar.

Appendix 5: Research Ethics Approval Letter

SOCIAL SCIENCES & HUMANITIES
INTERDIVISIONAL RESEARCH ETHICS COMMITTEE
DEPARTMENTAL RESEARCH ETHICS COMMITTEE

Department of Education
15 Norham Gardens, Oxford OX2 6PY
student.curec@education.ox.ac.uk; staff.curec@education.ox.ac.uk

Wanying Zhong
Department of Education, Social Sciences Division
University of Oxford

20 March 2024

Dear Wanying Zhong,

Research ethics approval

Research title: Exploring English Teachers' Investment in Chinese Smart Classrooms from a Sociomaterial Perspective

Research ethics reference: EDUC_C1A_24_077

The above application has been considered on behalf of the Education Departmental Research Ethics Committee (DREC) in accordance with the University's procedures for ethical approval of all research involving human participants.

I am pleased to confirm that, on the basis of the information provided to the DREC, ethics approval has now been granted for this study.

Please note the following:

Personal data: It is the responsibility of the PI to ensure that all personal data collected during the project is managed in accordance with the University's guidance and legal requirements.

In-person activities: Any data collection involving in-person interactions with participants must have an up-to-date fieldwork risk assessment in place; further guidance is available from the Safety Office's website.

Amendments: Please notify the committee if you intend to make any amendments to the information in your ethics application as submitted at date of this approval, as all changes must receive ethical approval prior to implementation. The amendment form is available on the SSH IDREC webpage.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to staff.curec@education.ox.ac.uk / student.curec@education.ox.ac.uk or ethics@socsci.ox.ac.uk.

Yours sincerely

Xin Xu

DREC member

cc: Anna-Maria Ramezanzadeh (as Supervisor)