From interaction to competency: the mediating role of social engagement in the emergence of materials-use competency among pre-service EFL teachers

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Abstract

Despite increasing attention to teacher professionalism, little is known about the micro-level classroom processes through which pre-service EFL teachers develop materials-use competency, especially in resource-constrained contexts where lecture materials dominate. Grounded in sociomaterialism, this study examines how social engagement during lecture-initiated interactions mediates the emergence of pre-service EFL teachers' materials-use competency. The dataset comprises 1,770 student responses across 28 classes in a teacher education module in Southwest China, analysed through two-round grounded coding, multimodal conversation analysis, and thematic analysis of instructor and student interviews. Three patterns of interactional entanglement (low, medium, high) were identified. These patterns shaped the conditions for dialogic learning, and it was particularly high-quality social engagement that mediated whether pre-service teachers transformed lecture discourse into situated instructional resources, enabling interactive designs. Structural and interactional constraints, including multimodal asymmetries and superficial translingual interactions, limited the occurrence of high-quality social engagement, thereby constraining the emergence of materials-use competency. The study contributes to sociomaterial perspectives in teacher education by showing how interactional entanglement and social engagement jointly shape the emergence of materials-use competency. Findings highlight the need to foreground social engagement in fostering such competency in teacher preparation.

Keywords: Social engagement, Materials-use competency, Pre-service EFL teachers, Sociomaterialism, Lecture-initiated interactions

Introduction

Amidst global shifts towards digitalisation and equity in education, teachers' competency in using instructional materials has become an important factor influencing instructional quality (Garay Abad & Hattie, 2025). While recognised in national policies emphasising teacher professionalism, such as China's *Outline for Building a Leading Education Nation (2024—2035)* (SC, 2024), developing materials-use competency remains

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particularly challenging for pre-service teachers in resource-constrained contexts. In this study, resource-constrained contexts refer to settings characterised by limited digital competency among teacher educators and restricted access to digital materials, which position instructor-led lectures as a primary site for teacher learning (Charlton, 2006; Deroey, 2015). It is within these lectures, conceptualised here as sociomaterial artefacts (cf. Crook, 2023; Guerrettaz et al., 2021), that future EFL teachers engage with instructional discourse and begin to develop their materials-use competency.

This study adopts a sociomaterial perspective, conceptualising materials-use competency not as an individual cognitive skill, but as a capacity that emerges through moment-to-moment interactions with future teachers, teacher educators and artefacts (Fenwick, 2015; Toohey, 2019). Within lecture-initiated interactions, dialogic learning arises as knowledge is co-constructed rather than passively received (Lin et al., 2024). Social engagement denotes the interpersonal and affective dimension of that process, manifested in affiliative, reciprocal, and supportive exchanges. This interpersonal quality conditions the extent to which dialogic learning leads to meaningful reflection and contributes to the emergence of materials-use competency (cf. Henning, 2019; Draper & Anderson, 1991).

However, the empirical evidence for this process remains limited. Social engagement is rarely the focus of empirical studies on engagement and proves difficult to capture with conventional instruments (Hiver et al., 2024). Moreover, prior studies on materials-use competency have primarily focused on in-service instructors and resource-rich contexts (Choppin, 2009; Davis et al., 2014), resulting in a limited understanding of how materials-use competency emerges in classroom interactions during teacher preparation. Meanwhile, research on future teachers' dialogic learning has emphasised post-hoc reflections (e.g., Santoso & Mangkuluhur, 2024) rather than the interactional processes through which social engagement mediates their professional development within teacher education classrooms. Little empirical attention has been paid to the complex interaction of materials, bodies, and discourse and the mediating role of social engagement in the emergence of materials-use competency.

To explore how materials-use competency emerges among pre-service EFL teachers, the study focuses on an EFL teacher education program at a resource-constrained university in Southwest China. This context is both distinctive and illustrative, as reliance on the instructor's oral discourse as a primary sociomaterial artefact is common in similar programmes. In this study, dialogic learning is understood as the socially mediated process through which pre-service teachers' materials-use competency begins to emerge, whereas social engagement reflects the affective and interpersonal quality of participation that sustains and enriches that process. Lecture-initiated interactions provide the primary setting for such learning, and the quality of social engagement shapes how these interactions contribute to professional growth. The following research questions guide the study:

RQ1: How do pre-service EFL teachers' interactions with lecture-discourse, conceptualised as a material resource, shape dialogic learning in resource-constrained classrooms?

RQ2: How does the quality of pre-service EFL teachers' social engagement during dialogic learning mediate the emergence of their materials-use competency?

Theoretical foundations

Lectures as sociomaterial contexts in teacher education

From a sociomaterialist perspective, intra-action refers to the dynamic co-constitution of meaning by humans and materials, positioning artefacts as active agents shaping classroom participation (Fenwick et al. 2011; Fenwick 2015; Guerrettaz, 2021; Guerrettaz et al., 2021). In lectures, design logic, pace of delivery, sequencing, and multimodal cues such as board layout or slides transitions can trigger students' embodied and discursive responses like gazes, gestures, pauses, or questions, which in turn affect the content and flow of the lecture (cf. Toohey, 2019).

Under this framework, the classroom is viewed as an entangled field of instructors, students and materials. The entanglement between material-body-discourse is reflected in students' behaviours such as gaze, gesture, questioning, or feedback (Frymier & Houser, 2016; Goldberg et al., 2021; Guerrettaz et al., 2022).

Previous studies have emphasised the agentic roles of instructional materials in shaping classroom interaction (e.g.,Guerrettaz, 2021; Tang, 2024). Yet highly structured materials (i.e., lectures) may restrict interactional possibilities in resource-constrained contexts, thereby limiting opportunities for dialogic learning (French & Kennedy, 2017). What remains insufficiently understood is how lectures, as dominant spoken-textual artefacts, simultaneously constrain interactional possibilities and create conditions for pre-service teachers' emergent materials-use competency. Addressing this requires close examination of the micro-processes of entanglement manifested in lecture-initiated interactions.

Social engagement: mediating the relationship between Entanglement and Learning

*One crucial dimension concerns social engagement, which we conceptualise as a mediator between entanglement and learning, as it fosters knowledge co-construction, sustains motivation through social support, and extends access to learning opportunities (*de Abreu, 2005; van der Veen, 2010*;* Bonoli, 2020*).*

Social engagement *reflects students' affiliative, reciprocal, and supportive orientation to*wards peers and instructors *in* shared *task*s (Hiver, 2024; Lambert et al., 2017). It manifests across *verbal and nonverbal* dimensions (Kosel et al., 2023; Warayet, 2011*).* V*erbal*ly, c*ollaborative utterances that build on or extend others' contributions* provide *cognitive scaffolding and affective empathy (*Ouyang et al., 2024; Goldfarb Cohen, 2023). Behaviourally, reciprocity is manifested through learners' willingness to listen, the use of backchannels (e.g., yeah) to signal attentiveness, and contributions that extend or complement peers' talk *(*Lambert et al., 2017*).* Nonverbal cues, such as collective gaze towards the instructor, smiling, or nodding, *convey emotional* recognition *and belonging*, reinforcing a sense of community *(*Paneth et al., 2024).

*Importantly, engagement can be distinguished as proactive or reactive. Proactive engagement reflects sustained interaction and intrinsic motivation (*Lambert et al., 2017; Reeve, 2012*), whereas reactive engagement stems from external pressures and manifests as receptive or compliant behaviour (*Benware & Deci, 1984; Nikolova & Collis, 1998*). This distinction is crucial for lecture-based learning contexts.* W*hile structured discourse often elicits reactive responses, lecture-initiated interactions can*

also enable proactive engagement, creating conditions for the emergence of materials-use competence.

Materials-use competency

Materials-use competency has been broadly defined as teachers' professional capacity to transform curricular content into teaching and learning resources through interactions with instructional materials, students, and classroom contexts (Chen & Cheng, 2025; Woods & Copur-Gencturk, 2024). For the purposes of this study, it is conceptualised as the developing ability of pre-service teachers to enact this capacity through their interactions with instructional discourse, materials, and peers in instructor-led lectures.

Studies have conceptualized this competency in terms of evaluation, adaptation, and design (Lei, 2024), but recent studies have adopted a process-oriented view, arguing that competency is enacted dynamically through teachers' real-time judgments and improvisations (Li & Xu, 2020, 2021). It emerges through situated interactions with artefacts, instructors, and students.

For instance, in lectures, the instructor's discourse can function as a pedagogical artefact intra-acting with pre-service teachers' embodied and verbal responses. Such interaction often generates tensions, such as hesitation, misalignment, or interruption, which in turn prompt reflection on materials use (Li & Xu, 2021).

Nevertheless, much research remains human-centred, viewing instructional materials as passive tools and giving limited attention to how they actively orient classroom interaction (cf. Li & Xu, 2020). Sociocultural perspectives on the internalisation of cultural tools (Vygotsky, 1978; Lantolf & Poehner, 2014) likewise offer insufficient accounts of materials' agentic roles.

Furthermore, several areas are insufficiently addressed. First, most studies focus on in-service teachers, leaving pre-service contexts underexplored (Choppin, 2009; Xu et al., 2023). Second, research has centred on resource-rich environments, overlooking constrains in resource-constrained teacher education settings. Third, although dialogic learning has been recognised as a reflective practice (Santoso & Mangkuluhur, 2024), little is known about how lecture-initiated dialogic interactions, mediated by social engagement, support the emergence of pre-service teachers' materials-use competency.

Addressing these gaps, the present study reconceptualises instructor-led lectures as sociomaterial assemblages and explores how lecture-initiated interactions in EFL teacher education classrooms shape dialogic learning. Specifically, it examines how the quality of social engagement mediates emergent patterns of entanglement and supports the emergence of pre-service teachers' materials-use competency.

Methodology

Setting and participants

The study was conducted within the Comprehensive English Course, a compulsory first-year subject in a key teacher education university in less-developed Southwestern China. The course serves as an entry-level teacher education module that integrates language development with pedagogical thinking. Instruction focused on textual analysis, interpretive reading, and exam-aligned proficiency development, using a range of print-based materials including textbooks, recitation passages, and instructor-led lectures.

Classrooms were equipped with standard instructional technologies, such as a projector and a desktop computer. However, they lacked interactive facilities. And the fixed-row seating arrangement constrained group interaction and reduced opportunities for multimodal learning activities. Digital platforms were rarely integrated into classroom instruction. All these conditions typify a resource-constrained teacher education context as defined in the Introduction.

Participants included two experienced female instructors (T1 and T2), each with over 20 years of teaching experience. Both instructors had limited exposure to technology-integrated instruction. In addition to this, they were purposefully selected as teacher educators of resource-constrained classrooms with an established collaboration with the first researcher, which facilitated access and ensured maximal information richness. Additionally, 42 first-year government-funded pre-service teachers (mean age = 18.4; 78.6% female) participated, contractually committed to return to primary and secondary teaching positions after graduation. Ethical protocols were rigorously followed.

Given the course's dual role in supporting both language development and instructor preparation, this study foregrounded the instructor-led lectures occurring in this course not merely as instructional activities, but as oral discourse materials central to the teacher education process. These lectures were treated as the primary analytic site for examining how dialogic learning was negotiated in situ and how materials-use competency emerged.

Data collection

Data were collected over four weeks during the first semester, including classroom recordings, instructor interviews, student focus group interviews, and focus student interviews (Table 1; Appendix E).

A total of 29 sessions (45 min each) were video recorded with multi-source setup (3 high-quality cellphones and 1 digital recorder), yielding approximately 21 h of footage and 279,076 transcribed words.

Instructor interviews (n = 12) combined semi-structured (20 min, online, twice weekly within 24 h of class) and unstructured formats (5–8 min during breaks). Transcripts totalled 3,845 words. Semi-structured online interviews were conducted within 24 h of each recorded session, allowing for flexibility without disrupting instructors' workloads or interactions (Saarijärvi & Bratt, 2021). These interviews examined instructors' intended use of multimodal lecture elements (e.g., slides, gestures, prosody) to elicit

Table 1 Overview of data collection

Sources	Description
Classroom recordings	28 sessions (45 min each; 21 h total) Multi-source setup: 3 HD smartphones + 1 digital recorder
Instructor interviews	12 total: 8 semi-structured (online, 20 min each, twice weekly via WeChat, within 24 h of class), 4 unstructured (5–8 min, during lesson breaks)
Student focus groups	8 weekly sessions (QQ, Chinese) with 10 randomly selected students per session (30 min each)
Focal student interviews	4 participants (2 per class, contrasting participation levels). One 30-min retrospective interview each. Video-stimulated recall of 3 pre-coded lecture episodes (30–60 s)

student responses, their expectations for affiliative or supportive engagement, and strategies used to address mismatches between expected and actual classroom interactions. Additionally, unstructured interviews captured instructors' spontaneous and timely interpretations of student uptake or breakdown based on micro-level cues, as well as their real-time decisions on whether and how to adjust lecture delivery in response to student response (Chauhan, 2022; Schmidt & Zimmerman, 2004).

Eight Weekly post-lesson focus-groups interviews were conducted via QQ in Chinese with 10 randomly selected students per session, yielding 8,527 transcribed words. The interviews explored (1) when and how instructor-led lectures triggered reflection, (2) engagement with peers through affiliative or co-constructive talk, and (3) emerging competency of adapting lecture content in future teaching. Excerpts were labeled (e.g., "S4-G4-I-1025" for S4 in Group 4 on October 25th).

Finally, four focal students (FS) were selected through purposive extreme case sampling. FS1 and FS2 were highly interactive, FS3 and FS4 minimally engaged. They were selected to offer a clear contrast in social engagement. This contrast was important for the study, as comparing students who were highly interactive with those who were minimally or hesitantly engaged provided a basis for exploring how variations in social engagement shaped the emergence of materials-use competency during dialogic learning. Each student completed one retrospective interview (30 min) using video-stimulated recall of three pre-coded lecture episodes (60–90s, each including initiation, response, and feedback).

Interviews were conducted in two stages: first without audio, allowing participants to describe their recollection of intentions and interpretations based on visual cues alone; then with audio, to elicit further reflections on verbal interactions and clarify meanings. The interviews probed (1) cues prompting support, (2) evaluation of instructor/peer responses, and (3) suggestions for modifying the instructor's verbal prompts or board instructions to better guide your peers' contributions. All interview data were triangulated with classroom video and instructor interviews to enhance the reliability of the qualitative findings.

Data analysis

Lecture-initiated interactional sequences (initiation–response–follow-up) were employed as the unit of analysis (Zhao et al., 2014). Two lecture types (Woodring & Hultquist, 2017), low and high interaction (see Appendix A), were selected due to their structured participation opportunities that promote engagement (Ahern et al., 1992).

Data were analysed inductively following grounded theory principles. First, open coding was conducted by the first and third researchers who independently and repeatedly viewed the video data. Each interactional sequence was extracted, with student responses coded by type (e.g., brief answers, repetition of the instructor's wording or pronunciation, provision of personal examples, raising questions, and extension of the instructor's or peers' ideas). Instructors' moves (i.e., elicitation and feedback practices) were also annotated to capture the dialogic learning in which these responses emerged. A two-round coding analysis (Saldaña, 2013) was employed to examine student engagement across lectures (Table 2).

Table 2 Sample coding for student responses while engaging with lectures

		Data examples	Initial codes	Process codes	Focused codes
T2-10–25	T2:	Can I say "hello, guys"? Yes or No?			
	SS:	Yes	Confirming the instructor's question	Answering Yes/No questions	Demonstrating understanding through responses
T2-10–25	T	We've just said the synonym of "janitor" is?			
	SS:	Doorkeeper	Providing a known answer	Answering known-answer questions	Demonstrating understanding through responses
T1-11–09	T1:	It's about, urh, showing connections between events. Erh…, that is to say, be able to…?			
	S:	show the logic of what's going on	Demonstrating reasoning or inference	Answering open-ended questions	Demonstrating reasoning and critical thinking

Coding sample of student responses illustrating the derivation of focused codes during two-round coding. T1 = Mrs. Hua; T2 = Mrs. Vivi; S = student; SSS = students

Second, guided by a coding framework adapted from Waring (2011), Benware and Deci (1984), and Duchowski (2018) (see Appendix B), initial codes were grouped into broader categories (mapped to corresponding "subtypes" in Appendix B) to identify distinct forms of responding behaviours. Then, as shown in Table 2, focused coding grouped these subtypes into focused codes (mapped to corresponding "types" in Appendix B).

Third, following Saldaña's (2013) two-round approach, researchers randomly entered all focused codes into another Excel document and used axial coding to recombine them. These axes were categorised into passive compliance (low entanglement, e.g., answering specifically assigned questions), proactive extension (medium entanglement, e.g., voluntary step-in), and critical Inquiry (high entanglement, e.g., questioning). These categories represented the varying degrees to which student responses became entangled in the lecture flow.

To further explore how these entanglements were interactionally constructed, we applied multimodal conversation analysis (Mondada, 2016; Sidnell, 2013) to representative extracts, each corresponding to a different level of entanglement. This enabled fine-grained examination of how gesture, gaze, prosody, and materials use, illustrating how learners' moment-to-moment choices emerged through the orchestration of interactional resources (Matsumoto, 2021), such as lecture design and semiotic resources.

Two four-level rubrics were developed to code students' interactional contributions (Entanglement) and social engagement (Social Engagement) during lecture-initiated interactions (Appendix C). Entanglement was coded from 0 (no uptake) to 3 (transformative uptake), reflecting the depth of contribution, while Social Engagement was coded from 0 (no engagement) to 3 (co-constructive engagement), capturing the degree of reciprocal and collaborative orientation. The first and third researchers

independently coded the entire dataset using this rubric, yielding high interrater reliability (Cohen's κ = 0.83).

Finally, interview transcripts were thematically analysed (Braun & Clarke, 2006). Three interrelated thematic domains were identified: (1) strategies by which teacher educators elicited student responses (e.g., clarification requests); (2) student perspectives on when and how lectures triggered engagement; and (3) tensions or misalignments between intended design and actual uptake, and their implications for materials-use competency emergence. These themes were iteratively refined to align with research questions.

Findings

Patterns of interactional entanglement

Students' verbal and nonverbal responses were conceptually grouped along two dimensions: (a) locus of initiation, distinguishing instructor-prompted from student-initiated responses, and (b) depth of contribution, reflecting the degree to which a response contributed to the ongoing classroom interaction. As shown in Appendix B, depth of contribution ranged from compliance (e.g., answering assigned questions, reading aloud, carrying out teacher instructions), through insertion (e.g., echoing or imitating the teacher's language, translating words, adding gestures or gaze beyond minimal compliance), to inquiry (e.g., posing questions, expressing personal views, or note-taking that extended the lecture content). These dimensions provided the basis for identifying patterns of interactional entanglement.

As presented in Appendix F-1 and F-2, pattern A (low entanglement) comprised 1,548 responses, predominantly within the instructor-led IRF (Initiation–Response–Feedback) sequence. These included 830 nonverbal and 718 reactive verbal responses, reflecting student attentiveness and alignment with the instructor-dominated structure without altering the ongoing discourse. Pattern B (medium entanglement) encompassed 220 responses, where students actively contributed beyond assigned tasks, reflecting a higher engagement. Although rare, Pattern C (high entanglement) was observed only twice, representing intensive student-initiated engagement that temporarily shifted lecture flow. Representative extracts following CA conventions (see Appendix D) with accompanying images.

Entanglement and social engagement within three patterns

Low entanglement (Pattern A)

The low-entanglement pattern of interaction typically unfolds within instructor-controlled IRF sequences, where students' participation remains responsive and reactive. Instead of generating a new dialogic sequence, students' turns serve to confirm or minimally complete instructor prompts.

Extract 1 illustrates the pattern in a vocabulary comparison task ("smile vs. beam"). The transcript below shows that students collectively provided short lexical responses (Turns 2, 11), followed by embodied actions such as note-taking and head lowering (Turn 3), as captured in Fig. 1. These embodied cues highlight attentiveness but not negotiation, as the task was accomplished through dictionary consultation without peer inquiry or expansion. Although they generate responses, they lack spontaneous follow-up questions or negotiation, typical of a low-interaction scenario.

Fig. 1 Completing the dictionary lookup task

Fig. 2 Listening to the instructor's explanation

Extract 1 Participants: Mrs. Hua (T1), Luke (student), and SSS (other 15 students).

1	T2:	哪个动作大点**? (Which one's the bigger gesture?)** =
2	SSS:	={Beam.}=
3		{bury heads in the notes, recording key information on word sense}
4	T2:	=Bea:m's movements should be bigger, right?↓
5		(0.2)
6	SSS:	Yeah.=
7	T2:	=That is to say::, simply, say it with < a wider grin > . SUPPOSE, > for example: < ,
8		you're going to a PHoto:grapher:↑ to take a picture: for your:↑ passport:↑ for
9		your: identification card:, and then:: would you smile: or would you BEAM?
10		(0.2)
11	SSS:	{Smile.=}
12		{gaze at T2 voluntarily, see Fig. 2}

Table 3 Key turns and multimodal cues during interaction with low entanglement

Turn	Speaker	Key talk & embodied action	Level of entanglement	Social engagement
1	T2	"哪个动作大点?"(clarification request)	1	1
2	SSS	{Beam.} {Smile.}+gaze at instructor	1	2
3	SSS	bury heads+note-taking on "beam"/"smile"	0	0
6	SSS	"Yeah=" (low tone of agreement)	1	1
11–12	SSS	"Smile."+voluntary gaze at T2	1	2

The limited engagement was further observed in the coding in Table 3. Several turns were coded at level-1 entanglement (minimal uptake), as in the choral response "Beam. Smile." (Turn 2) or the acknowledgment token "Yeah" (Turn 6), which signaled alignment but did not extend or reframe the instructor's prompt. Nonverbal compliance, such as burying heads in notetaking (Turn 3), was coded at level-0 entanglement with level-0 social engagement, reflecting passive orientation to the task rather than active participation. Even where affiliative orientation was evident (e.g., collective gaze in Turn 2 or voluntary gaze accompanying "Smile" in Turn 11) social engagement rose only to level-2 alignment, without progressing into co-construction.

In sum, low entanglement reflects passive compliance. Within this pattern, students responded verbally or nonverbally, but their contributions neither challenged nor reshaped lecture discourse.

Medium entanglement (Pattern B)

Medium entanglement was observed when students contributed beyond merely following instructions or answering assigned questions, while still aligning with the instructor-led structure. A total of 220 such responses were coded, the majority involving form-oriented contributions such as voluntary pronunciation imitation (n = 176), spontaneous translation (n = 15), and reading aloud (n = 13). A smaller proportion reflected meaning-oriented elaborations (n = 12), including echoing the instructor's ideas in ways that supported peer understanding.

Extract 2 (full transcripts in Appendix G) exemplifies this dynamic. When Luke provided a dialectal expression (Turn2) after English-Chinese translation, his embodied leaning forward and intonational play drew immediate attention from both the instructor and peers. The instructor's smile and gaze (Turn 3) acknowledged the initiative, while the class responded with laughter and applause (Turn 5–6), as captured in Fig. 3 and 4. Luke further extended the episode by reiterating a colloquial phrase in Chinese like "你长得真好看" (i.e., You are truly beautiful), which may carry affective resonance (Turn 13). The sequence illustrates how student-initiated turns, though playful, temporarily re-oriented the class discourse toward emotional alignment and peer solidarity, while still allowing the instructor to resume control of the lecture discourse.

Fig. 3 Discussing in groups

Fig. 4 Presenting translation works in groups

Extract 2 Participants: Mrs. Hua (T1), Luke (student), and SSS (other 25 students).

1	T1:	＝啥啥啥**?(What what what?)**
2	S:	俺的妮儿↑,你长得:**真**:好看:.[**我是如**:**此爱你**.!(My dear girl, you are truly
3		beautiful. I love you so much.)
4	T1:	[HUHHHHH.HHHHHH
5	S:	亲爱的妮儿:,俺对你的爱,**至死不渝**:,就像海水(.)[**永**:**不干涸**. (Dearest girl, my love
6		for you shall endure until death, just as the sea shall never run dry)
7	SSS:	{[HUHHHHH.HHHHHH.HHHHHH}
8		{applaud spontaneously}
9	T1:	有一样**肯定的是**,这个**真的**是用了<u>dialect</u>,用**方言来说的**. (One thing is certain:
10		this is genuinely expressed in dialect) >就是**好像没听太懂**<, 你**说什么**:?°俺的妮儿,
11		妮儿, **我的妮**:儿°, 长得**真俊**是吧: ?(I'm afraid I didn't quite catch that. What
12		did you say? My dear girl, you're rather pretty, aren't you?)
13	S:	{你长得**真好**看(You are truly beautiful).}

The coding in Table 4 illustrates an intermediate interactional pattern. Extended translations (Turns 2, 5) and the emotionally marked clarification (Turn 13) reached level-2 entanglement and higher social engagement, signaling proactive elaboration and affiliative resonance. By contrast, the instructor's laughter, affirmations, and confirmation checks (Turns 1, 4, 9) remained at level-1 entanglement, reflecting continued reliance on instructor framing. Collective laughter and applause (Turn 7–8) further amplified affiliative alignment, raising social engagement to level-2 but without producing new meaning.

Overall, medium entanglement reflects light feedback with emotional resonance. In this pattern, students insert elaborations that enrich form and meaning, yet the lecture's structural dominance remains intact.

Table 4 Key turns and multimodal cues during interaction with medium entanglement

Turn	Speaker	Key talk & embodied action	Level of entanglement	Social engagement
1	T1	"啥啥啥?" (clarification request)	1	1
2	S	"俺的妮儿…我是如此爱你!" (translation, extended turn)	2	2
4	T1	Prolonged laughter "HUHHHHH"	1	1
5	S	"亲爱的妮儿…至死不渝, 就像海水永不干涸" (translation, extended elaboration)	2	2
7–8	SSS	Collective laughter + spontaneous applause	1	2
9–12	T1	Affirmation + confirmation check ("你长得真俊是吧?")	1	1
13	S	"你长得真好看" (using Chinese, emotionally marked)	2	3

High entanglement (Pattern C)

Highly entangled situations are rare, occurring only twice, yet they reveal important changes in classroom interaction that show the early development of materials-use competency. In this pattern, students initiated turns voluntarily, such as asking spontaneous questions. These student-initiated contributions actively promoted meaning clarification and collaborative knowledge construction, rather than merely supplementing the instructor-led discourse. As a result, the interaction shifted from being primarily instructor-led to a more reciprocally negotiated exploration between the instructor and the students.

In Extract 3 (full transcripts in Appendix G), before the instructor completed the turn, David quietly interjected "°But I think° it is a PUN↑?°" and lifted his head to engage peers (Fig. 5). The instructor immediately paused, acknowledged the bid, and offered a bilingual clarification ("PUN, 双关"), then explained from the literal sense of shining to the metaphorical reading of "reflect = show". This student-initiated contribution not only elicited instructor uptake but also triggered a shift from routine explanation to collaborative sense-making. The subsequent clarification and elaboration unfolded as an extended meaning negotiation, where linguistic form became a resource for deeper semantic exploration.

Fig. 5 Inserting a question to prompt layered explanations from the instructor

Table 5 Key turns and multimodal cues during interaction with high entanglement

Turn	Speaker	Key talk & embodied action	Level of entanglement	Social engagement
1–2	S	""But I think it is a PUN↑?"+holds up head, watched by peers	3	3
3–6	T2	Acknowledges+repeats student's idea+initiates clarification ("pun, 双关")	2	2
7–10	T2	layered explanation (from literal to figurative)	3	1

Extract 3 Participants: T2 (Mrs. Hua), David (student), and other 15 students.

1	S:	[{°But I think° it is a PUN↑?}=
2		{*holds up head while being watched by other students*}
3	T2:	=Yeah, >I think (^) it's a PUN<. Yes:. Urh:
4		(0.2)
5		°you know° pun↑?
6		(0.2)
7		PUN↓, 双关(using Chinese: clarification), okay(.) ? So I think his point is tha:t,
8		first of a:ll, the first layer: mea:ning of the sentence is THAT>because if the<
9		…The SEcond of a:ll is THA:T: because "reflect" can>also be used
10		FIguratively<:…>Okay↑, very good!<I think

The coding in Table 5 illustrates high entanglement, where the student's metalinguistic proposal ("It is a pun?") was coded at level-3 entanglement and level-3 social engagement, signalling initiative and peer orientation. The instructor's subsequent clarification (Turns 3–6) was coded at level-2 entanglement with level-2 engagement, sustaining but not fully redirecting the interactional trajectory. The layered explanation (Turns 7–10) reached level-3 entanglement yet only level-1 engagement, as elaboration unfolded with limited peer-to-peer uptake.

Overall, high entanglement reflects dialogic expansion initiated by students, where materials serve as resources for jointly constructing extended meaning, moving the lecture discourse beyond instructor-led scaffolding.

Mediating role of social engagement

Sections 4.1–4.2 addressed RQ1 by showing how lecture-initiated interactions with varying degrees of entanglement shape pre-service EFL teachers' dialogic learning. Building on the findings, this section turns to RQ2. Drawing on focal-student interviews, it examines how the quality of social engagement, reflected in affiliative, reciprocal, and supportive responses, mediates the emergence of their materials-use competency. Social engagement was coded on a 0–3 scale based on students' verbal and embodied orientation toward peers and the instructor (Appendix C-2), with higher scores reflecting affiliative, reciprocal, and co-constructive interactions.

Our findings show that while classroom interactions create the conditions for dialogic learning, the enactment of materials-use competency depends critically on the quality of social engagement. High Social Engagement scores were associated with transformative pedagogical thinking, enabling pre-service teachers to reconceptualise lecture discourse as relational instructional resources and to design interactive, student-centred

learning experiences (materials-use competency [MUC] = 2–3). In contrast, low Social Engagement (0–1) limited competency to technical or procedural adaptations, such as segmenting board space or adjusting pacing, without supporting interactive or co-constructive design (MUC = 0–1).

Evidence from the four focal students' interviews (Appendix H) demonstrates this mediating role. High-engagement students (FS1 and FS2), either explicitly proposed or implicitly embedded interactive strategies like peer guessing games (FS1-3) and voting mechanisms (FS2-3). These moves exemplify the fundamental principles of materials-use competency: adaptation and design aimed at encouraging student interaction. In contrast, among the six excerpts from the low-engagement students (FS3 and FS4), four (66.7%) focused on technical or procedural modifications, such as segmenting board space (FS4-2), slowing speech (FS3-3), or providing structured answers (FS3-2). These ideas, while demonstrating a basic level of evaluation, fall short of the transformative design that is fundamental to the competency definition defined in 2.3. This quantitative pattern suggests that social engagement is not merely supplementary but functions as the key mediator that elevates pedagogical thinking from compliance and technical adjustments to emergent, context-sensitive materials-use competency. Quantitative patterns across these students confirm a consistent co-occurrence of higher entanglement, higher social engagement, and higher MUC scores.

The qualitative data illuminate the mechanisms underlying this mediation. The cases of focal students (FS1 and FS2) exemplify how high-quality social engagement dynamically supports the enactment of materials-use competency. Their engagement was triggered by rich social events, such as a peer's humorous use of dialect (Extract 2) and the proactive clarification of a pun (Extract 2).

FS1, who initially "just wanted to put the Mandarin translations on the slides," explained that his classmate's humorous attempt "made us all chuckle," which in turn led him to consider asking students to translate in several dialects for comparison. Similarly, FS2's idea to "use voting to select the best translation" is another instance of transforming static content (translations) into dynamic learning resources. Both instances are not just presenting information; they are designing a context for student–student and student-material interaction. This process aligns with the definition of competency as an emergent competence enacted through "real-time judgments and improvisations" in response to both humans and materials.

In contrast, the reflections of FS3 and FS4 illustrate how a lack of social engagement stagnates the emergence of their materials-use competency. This stagnation confines competency to a basic, technical level. Their post-lecture reflection was triggered by passive and materials-focused cues like "PPT animation" and "blackboard drawing". Their social posture was also reserved, characterised by behaviours like "just smiling and nodding" or "looking down and not responding". As a result, their pedagogical thinking stayed within the safe boundaries of instructor-controlled information delivery.

FS3's idea to "split the PPT into two columns" was a structural adjustment for clarity. FS4 likewise reflected, "Truthfully, I simply focused on jotting down my own notes at the time. There was no discussion between us. So two options for developing my own teaching strategy were to write steps on the blackboard sequentially or to

ask students to write down their thoughts" (FS4-I-1029). His proposal to "divide the blackboard into question and answer zones" reflects the same focus as FS3, emphasising technical adaptations over designs that foster interaction. In both cases, what was altered was the format rather than the interactive potential of the content. Without social engagement, their situated practice of materials-use competency resembled that of curriculum executors, focused on technical delivery and surface adjustments. What was lacking was the transformative shift towards curriculum designers, who reconfigure materials as resources for student–material interaction.

In sum, the quality of social engagement determines whether pre-service teachers' interactions with lecture discourse remain procedural or evolve into transformative, interactive instructional practices, thereby mediating the emergence of materials-use competency in resource-constrained EFL classrooms.

Discussion

This study shows that highly entangled lecture-initiated interactions shape dialogic learning in resource-constrained EFL classrooms, and that the quality of social engagement plays a mediating role in the emergence of materials-use competency among pre-service EFL teachers.

Fragile transformation from lecture-initiated interaction to dialogic learning

The findings suggest that high entanglement (Patterns B and C in Sect. 4.2), can serve as critical sites for initiating dialogic learning. Moreover, the study further emphasises that the concept of entanglement transcends superficial forms of interaction, echoing the views of Chappell et al. (2019) and Nelson et al. (2021). It reveals a pivotal shift from passive knowledge reception (e.g., low-entanglement Pattern A) towards students adopting an orientation towards joint inquiry. This orientation forms the foundation of dialogic learning, as it allows for the creation of a "dialogic space" (Dan & Li, 2024; Palmgren-Neuvonen et al., 2021). In this space, the instructor's discourse functions not as a closed, authoritative direction but instead operates as a half-finished utterance (Yang et al., 2025).

Nevertheless, opening a dialogic space and engaging in reflection-in-action do not automatically lead to the emergence of materials-use competency. The study shows that even under high levels of engagement, translating dialogic reflection into competency is not guaranteed.

This result indicates deeper structural barriers in EFL learning contexts, most notably the compliance-empowerment paradox. The compliance-empowerment paradox reveals that even when interaction initiated by lectures is frequent, students tend to prioritise maintaining alignment with the instructor's authority rather than engaging in genuine negotiation of meaning. As shown in Appendix F-3, high-interaction lectures raise the instructor-student turn ratio (e.g., to 1:1.85), creating the impression of increased student participation. Yet a more detailed examination of the data (Appendix F-4) reveals that most student-initiated responses remain small, with the median contribution at zero and over 80% of instances consisting of low-risk compliance behaviours like imitating pronunciation.

This might be due to the influence of Confucianism and classroom authority structures, aligning with Chen (2022) and Lee et al. (2009). Participation thus risks becoming "compliance-in-action" rather than Schön's (1983) "reflection-in-action". Such orientations are not accidental but are also shaped by broader career expectations. As one student explained, "I'm on a government scholarship to study English, so I'm pretty sure I'll be teaching it after I graduate. Pronunciation matters for getting a job that satisfies me" (S2-G1-I-1108). Here, mimicry functions as a pragmatic and even productive strategy, yet it may limit the depth of future teachers' reflection and opportunities for meaningful engagement, as suggested by Samifanni's (2020) findings.

### Social engagement as a crucial mediator and its barriers

Data analysis further indicates that the quality of social engagement is the key factor shaping whether dialogic learning extends beyond individual reflection to support the emergence of materials-use competency among pre-service EFL teachers. Social engagement acts as the link between isolated individual reflection and the development of collective pedagogical agency (Eriksson et al., 2019).

Pre-service teachers with high social engagement (e.g., David, FS1, FS2) went beyond mere compliance during lecture discourses. They engage in interactions that exemplified thinking in resonance (Yang et al., 2025). Such collaborative cognition fostered their design of complex, student-centred activities. This shift positioned the pre-service teachers within a network of actants (Latour, 2005), where they and the materials co-negotiated both the content and the mode of teaching (Guerrettaz, 2021), indicating the early emergence of materials-use competency as a relational practice.

Conversely, those with low social engagement (e.g., FS3, FS4) displayed individualised and safety-oriented cognitive processing. Lacking supportive social scaffolding, their reflections remained isolated. Consequently, the instructional strategies (e.g., board writing) they proposed tend to be instructor-centred and low-risk. In such cases, the student-material relationship remains hierarchical and predetermined, reflecting an understanding of instructional materials as fixed scripts to be followed. This view echoes Reeve's (2010) critique of script pedagogy, which constrains teachers' agency and conceptual understanding. The resulting "materials executor" mindset illustrates the absence of materials-use competency, as sociomaterial practice is reduced to passive reception and reproduction.

The clear difference between these two groups suggests that high-quality social engagement does not arise spontaneously but depends on the surrounding institutional context. As discussed in 5.1, our findings show that its development is fundamentally constrained by a structural barrier: the compliance–empowerment paradox. This paradox becomes visible and reinforced through two interrelated interactional barriers, as illustrated in Fig. 6.

The first manifestation of this paradox is multimodal asymmetries. The lecture's heavy reliance on an auditory-centric, monomodal design establishes a hierarchy of comprehension that favours compliance over exploratory engagement. As one student (S2) recalled, "When the instructor only explains verbally, I sometimes feel lost, especially when difficult words or long sentences appear" (S2-G1-I-1025). Another added, "In high school, my instructor explained in Chinese, but in college, the primary language used
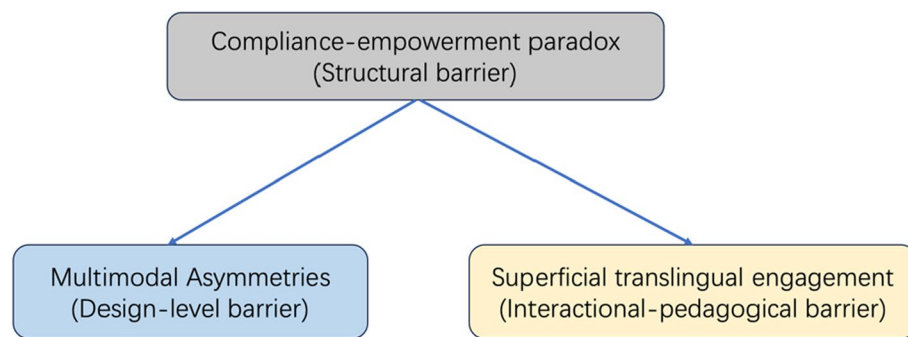
Fig. 6 Barriers to the establishment of high-quality social engagement in classroom interactions

in class is English. When I do not understand, I just stay quiet" (S3-G1-I-1025). These reflections show how a monomodal approach not only stratifies participation but also discourages students from taking dialogic risks. As van Dijk and Rietveld (2017) argue, affordances are always entangled with sociomaterial practices. In this sense, the monomodal constraint of lecture-discourse affords listening and note-taking but constrains creative and embodied meaning-making, thus directing interactions toward correctness and conformity rather than dialogue and negotiation.

The second manifestation is the superficial engagement with translingual potential. As Heller (2015) shows, classroom discourse norms are often invoked in ways that regulate how students explain, argue, and participate. Our data shows that when students tried to use their full linguistic repertoires (e.g., Luke's use of dialect, Extract 2), the instructor's response ("=What what what?"), while well-intentioned, closed off a potentially rich dialogic opportunity and reduced a translingual practice to a matter of lexical clarification. Similar dynamics appeared in the interviews. One student said, "I thought about using my dialect, but the instructor just laughed, so I stopped" (FS2-I-1030). The instructor noted, "When students' pronunciation deviates too much, I instinctively correct it orally to sound more native-like" (T2-I-1103). These reflections and practices suggest that student agency is constrained by a range of linguistic and interactional norms. In this way, the classroom overlooks the value of students' linguistic resources as part of sociomaterial assemblage (Guerrettaz et al., 2021).

In conclusion, the compliance–empowerment paradox, manifested in multimodal asymmetries and superficial translingual interactions, creates a classroom environment where establishing high-quality social engagement in interactions is challenging. This, in turn, restricts the potential of lecture-initiated interactions to function as a generative resource for pre-service EFL teachers, keeping their learning at the level of passive knowledge reception rather than supporting the active, agentic emergence of materials-use competency.

Implications
Practically, teacher educators should design lecture activities to foster high-quality social engagement, which mediates the transformation of materials from lecture materials into

interactive, context-sensitive resources. In resource-constrained lectures, this can be achieved through inquiry questions that promote cognitive entanglement (e.g., "What if…?", "How could we adapt this for…?") and collaborative activities that encourage discussion, negotiation, and joint decision-making. These activities cultivate a socially and cognitively engaged learning community and help pre-service teachers recognise how interaction patterns shape their instructional design thinking. In digitally rich or multi-modal classrooms, teacher-designed activities such as interactive simulations or online discussion boards can provide additional ways for students to engage and co-construct meaning.

Theoretically, this study offers a micro-analytical perspective on how dialogic learning may unfold in lecture settings similar to those examined here, highlighting the interplay of interactional entanglement, social engagement, and materials-use competency. Moreover, the findings reinforce that materials-use competency is not merely an individual cognitive achievement. Its development is socially mediated and strongly shaped by the quality of social engagement among pre-service teachers and in their interactions with instructional materials.

Limitations and future research

This study has several limitations. Firstly, it was conducted in a specific EFL environment with limited resources, so its findings may not directly generalise to resource-rich classrooms or culturally different settings. Secondly, the study involved a relatively small number of pre-service teachers. Future research could examine the mediating role of social engagement using larger samples. Thirdly, the study captures only the early classroom engagement of pre-service teachers and their emerging materials-use competency; future research could follow these teachers into their classroom practice to examine how social engagement contributes to the development and enactment of materials-use competency.

Conclusions

This study demonstrates that the emergence of materials-use competency among pre-service EFL teachers depends less on the frequency of lecture-initiated interactions than on the quality of social engagement they sustain. The findings show that, even in resource-constrained classrooms, lecture-discourse can foster materials-use competency when participation moves beyond compliance and is mediated through high-quality, collaborative engagement. The study contributes to sociomaterial perspectives in teacher education by highlighting materials-use competency as a relational practice and by emphasising the value of instructional designs that foster dialogic and socially mediated teacher learning.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40862-025-00370-9.

Additional file 1.

Author contributions
WD: lead conceptualization, investigation, methodology, coding and analysis, writing-original draft, writing-review & editing. HZ: coding framework development, methodological design, conceptual guidance, data verification, writing-review & editing. ML: conceptualization, investigation, coding and analysis, writing-review & editing. All authors approved the final manuscript.

Availability of data and materials
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval and consent to participate
This study was conducted in accordance with the *British Educational Research Association (BERA) Ethical Guidelines for Educational Research* (2018). As Southwest University does not currently have a formal Institutional Review Board, the ethical review and approval of the study were undertaken by a senior professor at the university with expertise in research ethics. All participating teachers and students participated in the study voluntarily. They were fully informed about the nature of the study, its objectives, and the potential use of their data. Ethical consent was obtained prior to their participation in observations or interviews. Participants were invited to review their interview transcripts before analysis and were informed that they could withdraw from the study at any time without adverse consequences. Confidentiality was ensured by replacing real names with pseudonyms and blurring all identifiable features in images while maintaining key expressions (such as gazing and grinning) relevant for analysis, with participants' agreement. To promote objectivity and accuracy in data analysis, all researchers collaborated during the coding process, compared findings, and reached a consensus on the conclusions of the analyses.

Competing interests
The authors declare no competing interests.

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