The Impact of AI-Assisted English Teaching Classrooms on TESOL Teachers' Teaching Beliefs: A Systematic Review

Yuhang Hou[1*]

[1]School of Education, University of Melbourne, Melbourne, Victoria, Australia

Abstract. As the rapid popularization of artificial intelligence (AI) technology has taken place in the field of English teaching, the teaching beliefs of TESOL teachers – namely, their understanding of the nature of language, the teaching-learning process, and that of a teacher-are also undergoing a radical change. Following the PRISMA 2020 process, screen and analyze 12 empirical studies conducted between 2015 and 2025 to understand, in particular, how AI-assisted instruction might impact TESOL instructors' pedagogical beliefs. The paper identified: First, AI shifts teachers' perceptions of language learning; Second, Teachers change from knowledge transmitters to learning facilitators; Third, Their emotions toward AI are mixed (efficiency gains vs. anxiety over technical uncertainty and professional identity loss). Meanwhile, institutional support, technical training, and teachers' AI literacy are also identified as important contextual factors that influence the level of belief change. This review offers a novel theoretical lens to understand the cognitive change of teachers in the AI era. It highlights that teachers' beliefs should be considered an essential variable in promoting AI teaching.

1 Introduction

1.1 Research background

The last decade witnessed explosive growth in research on applying Artificial Intelligence (AI) to learn and teach languages, steadily shifting from a supporting element to an important player with substantial involvement in the instruction process. With advances made in NLP, machine learning, and large-scale language models (LLMs), language learners can receive more intelligent, real-time, and personalized learning assistance [1]. For example, artificial intelligence-based writing feedback systems, speech recognition tools, and intelligent conversational robots are increasingly introduced into EFL/ESL (English as a Foreign or Second Language) learners' learning environments [2]. Not only can these tools facilitate access to teaching materials, but they also have a significant impact on how teachers view their pedagogical process, as well as learning content, learning process, learning context, learning methods, learning resources, teaching styles, learners' characteristics, etc.

* Corresponding author: houyuhang689@gmail.com

As a kind of artificial intelligence application, automated writing evaluation (Automated Writing Evaluation, AWE), which can analyze the learner's written text automatically according to an algorithm and give prompt feedback in time about grammar, vocabulary and cohesion, plays a vital role in teaching writing [3]. The most recent study shows that, besides enhancing students' writing quality, AWE has a significant impact on how learners write and is becoming a valuable technical tool for instructors to perform process-oriented assessments [4,5]. Accordingly, AWE can serve as a key window to perceive the effect of AI teaching.

1.2 The impact of AI on teachers' teaching beliefs: Challenges and opportunities in the new era

The roles and professional positions of the teacher are going to be changed by AI tools in an unprecedented way when they enter the classroom from transmitters of knowledge to facilitators of learning, technology selectors and data interpreters. Teachers have to reconsider how they use AI tools to support the development of students' writing, reading, speaking and general language skills [6]. This change is not natural and is highly affected by the teachers' strong teaching beliefs:

Research shows that teachers' beliefs about technology, values, and their understanding of learning are key factors determining the success or failure of technology integration [7]. Hellmich further noted that language teachers' trust in technology, their perceptions of its effectiveness, and their assessments of its controllability directly determine whether they are willing to adopt AI tools in the classroom [8]. In the era of rapid technological iteration, teachers often face a series of cognitive conflicts, including: Is AI feedback more reliable than teacher feedback? Will AI weaken teachers' professional judgment? Will students rely on AI and neglect the language learning process itself?

All these problems are relevant not only to the reception of technology by teachers but also to choosing a teaching strategy and making decisions in the classroom [9].

What is more critical, though, are the potential challenges to teachers' central teaching beliefs about language and learning trajectories, which might be undermined by AI technologies, such as classroom interactions. For example, the immediate feedback provided by AWE could alter a teacher's conventional view of what constitutes good writing feedback; the generative capabilities of AI writing tools can challenge teachers' notions of "language authenticity" and "creativity" [1]. Hence, AI is not only a technology artefact but has significant impacts upon teachers' conceptual frames as well.

1.3 The importance of teachers' beliefs: Theoretical foundation and technological integration logic

Teacher beliefs in TESOL have always been regarded as the core structure that influences teachers' behavior, teaching philosophy, and educational decisions [10]. Teacher beliefs include their understanding of the nature of language, the learning process, teaching goals, classroom roles, and evaluation methods, and are the deep driving force behind teachers' practice. Especially in the context of technology integration, teacher beliefs often become the "hidden determinants" for the implementation of technology.

Another theory that has had a great impact on the technology integration model is "First-Order/Second-Order Barrier Theory" by Ertmer [11]. First-order barriers are those outside factors, including equipment, external factors (i.e., resources and time), and internal factors of the second order (i.e., teachers' beliefs, values, and teaching concepts). Many studies show that, despite having sufficient technological resources to teach, unless teachers' beliefs support the educational values of technology, the integration effect can be quite limited [12].

In the context of AI technology, this theory is particularly important. Because the teaching application of AI is not only a change in the tool but often involves changes in teachers' professional identity, teaching control, classroom discourse power, and even evaluation standards. Therefore, studying how AI reshapes TESOL teachers' beliefs has significant theoretical significance.

1.4 Research gaps and research questions

Despite that previous studies have already gained abundant information regarding the functionalities of AI tech, student learning outcome, and system design, there are still few discussions about how teachers' belief changes when they teach with AI: Few discuss teachers' cognition changes, because teacher beliefs are multi-dimensional, but current studies usually only focus on teachers' willingness of using AI technology, ignoring the deep structure of the belief level, and rarely researches on systematically exploring the relation chain between AI and teacher's belief [13,14].

According to the above-research background, theoretical basis, and research gap, this paper is committed to focusing on the key issue "The Impacts of AI-Assisted Teaching on TESOL Teachers' Teaching Beliefs", and suggests, as a next step, considering the following three research problems:

How does AI-assisted English teaching specifically influence TESOL teachers' core teaching beliefs, including their understanding of the essence of language learning, teaching roles, and effective feedback?

What key factors will promote or hinder TESOL teachers from adjusting their teaching beliefs in the AI teaching environment?

How do changes in teachers' teaching beliefs further affect their classroom practice behaviors and AI technology integration strategies, and thereby reshape the teaching interaction model?

2 Methodology

2.1 Review design

This paper follows a systematic review research design in order to achieve an exhaustive, transparent and replicable evidence synthesis process about "The impact of AI-assisted English teaching classroom environment on TESOL teachers' beliefs towards teaching". The systematic review focuses on standardizing the process of conducting reviews and includes well-defined research questions, formulating searching strategies, using inclusion and exclusion criteria, literature screening, and conducting strict analyses on screened literature. It is an extremely reliable review technique that has been widely accepted in modern educational research [15].

To fulfill this purpose, in this paper the author strictly follows the guidelines for reporting a systematic review and meta-analysis, following PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) [15]. PRISMA 2020 is now the international standard for SRs, and has been used extensively in medical fields, social science, and education. Its major benefit is to facilitate homogenization of steps such as searching for literature, selection criteria, abstraction process and reporting results, thus improving the transparency and accessibility of the review research.

Finally, the systematic review approach fits in well with our current study as it can extract core evidence of teachers' change of beliefs among a multi-dimensional and cross-

disciplinary body of literature, thus laying down a good research basis to understand how AI reshapes the teaching concepts of TESOL teachers.

2.2 Data source scope and data selection

To comprehensively and systematically collect the empirical research of AI-assisted English teaching as well as TESOL teachers' teaching belief from year 2015 to year 2025, in this research the following four databases were searched in parallel; Scopus, Web of Science, Education Resources Information Center (ERIC) and Google Scholar, and strictly followed the literature identification principles of PRISMA 2020 [15]. The construction of the search strategy was intended to maximise the coverage of the search scope while guaranteeing the high relevance and academic level of the search results.

The author set the searching period as 2015-2025. The author chose this time range since, after 2015, with breakthroughs of deep learning and natural language processing(NLP), and with the advent of generative AI, AI tools started to grow rapidly in use for language learning; simultaneously, there was an increase in teacher belief-related studies too, so the author chose this epoch to be the main time window of this review.

After the search was completed, this study used Zotero for literature de-duplication processing to avoid duplicate records that could affect the subsequent screening results. The initially retrieved literature will enter the title and abstract screening stage, where studies that are obviously irrelevant will be eliminated. The literature that passes the initial screening will continue to enter the full-text screening stage to ensure that the research subjects, types of AI, research methods, and variables (teachers' beliefs) all meet the inclusion criteria.

To ensure that the systematic review was rigorous, transparent, and focused, we defined explicit inclusion/exclusion criteria following the PRISMA 2020 recommendations [15]. It can set structured standards to reduce subjective bias in screening and guarantee the methodological quality and theme of the finally included study (See Figure 1).

Inclusion criteria are as follows: (1) Research type: empirical research (2) Research topic: AI-assisted language teaching or using some related technology (3) Research focus: teacher's beliefs, attitude, or beliefs (4) Context of study: TESOL/ESL/EFL context (5) Year published: 2015–2025(6) Accessible full-text paper, in either English or Chinese.

Exclusion criteria are as follows: (1) Pure technical study (2) Non-empirical study and conceptual paper, which is not supported by any data (3) The subject of the study is not in the domain of English education (4) Study only on students' perspectives, however, no teachers' data included: (5) Abstracts of conferences, unpublished papers, or posters.

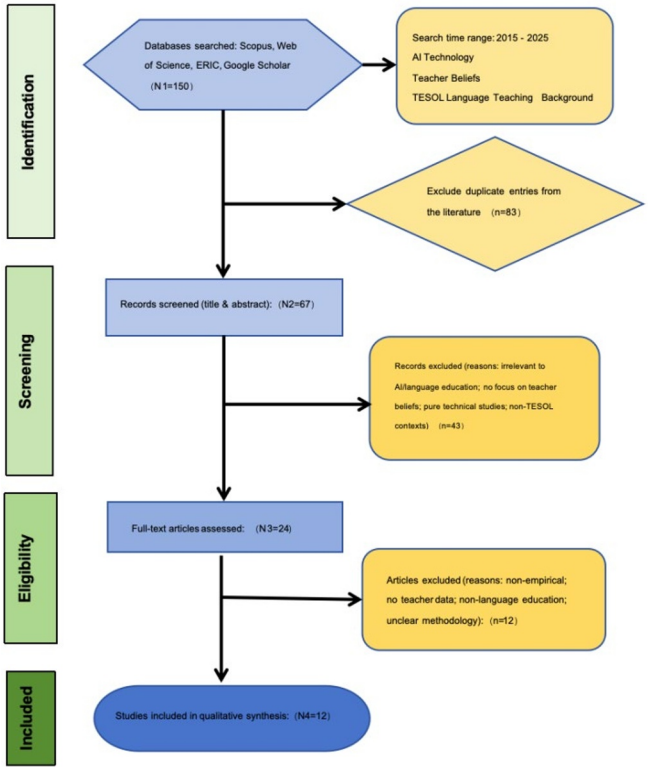

Fig. 1. Screening and PRISMA Flowchart

2.3 Data analysis approaches

Following the completion of the literature screen, all 12 final papers were extracted and coded by this paper. To guarantee the clarity and organization in the analysis process, this study used standard data extraction forms for documenting the research context, participant profiles, kinds of AI instruments, methodologies, main results and evidence on teachers' beliefs in each paper. This step is aimed at minimizing the bias of the researcher's own judgment, as well as ensuring the comparison among different studies.

To identify patterns of change in teachers' beliefs across studies, this paper used the latest edition of reflexive thematic analysis [16]. Reflexive thematic analysis is one of the popular qualitative analysis approaches for use in educational and social science fields, able to extract meaningful themes from different types of data and especially appropriate for the exploration of complicated psychological structures like teachers' beliefs.

This study followed its six-stage procedure (See Figure 2) : (1) Familiarization with the data (Familiarization) (2) Generation of initial codes (Generating initial codes) (3) Searching for potential themes (Searching for themes) (4) Reviewing themes (Reviewing themes) (5) Defining and naming themes (Defining and naming themes) (6) Producing the report (Producing the report).

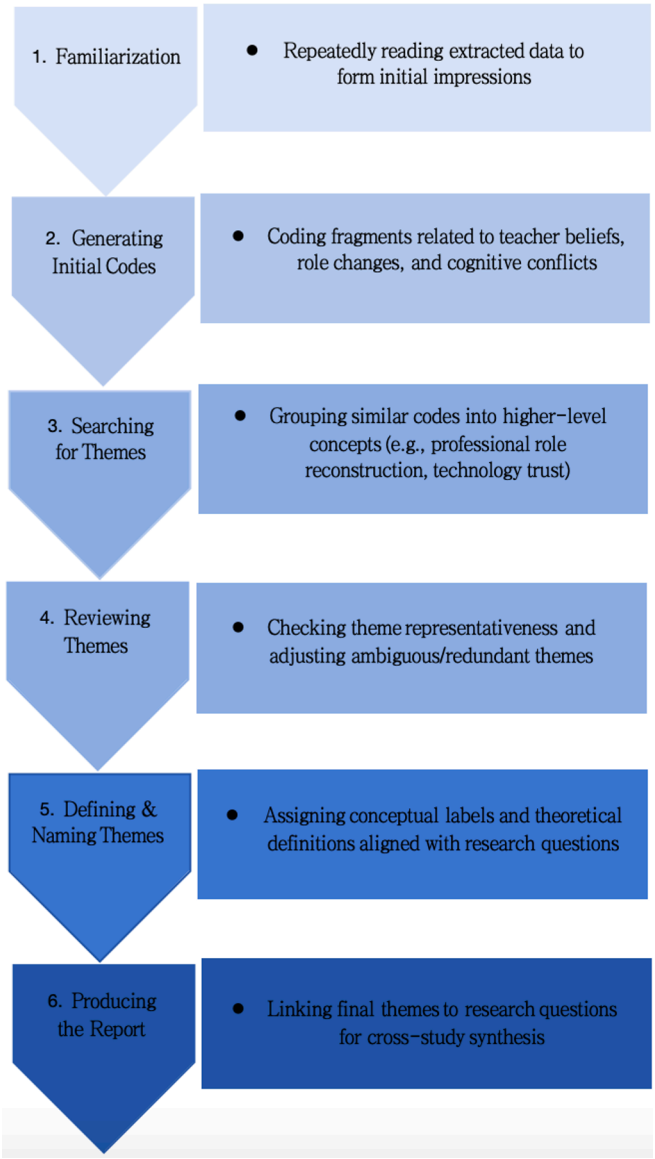

Fig. 2. Thematic Analysis Process

Through thematic analysis, this study is able to identify the common impacts that different AI tools have on teachers' beliefs, while also revealing the interaction mechanisms between technology, context, and teachers' psychological factors.

3 Findings

3.1 Response to RQ1: How does AI-assisted teaching influence the core teaching beliefs of TESOL teachers?

Based on the analysis of the 12 included empirical studies, AI technology is fundamentally reshaping the core teaching beliefs of TESOL teachers, mainly manifested in three

dimensions of deep transformation: professional role reconfiguration, redefinition of teacher authority, and rethinking of the essence of language learning.

First, with the function replacement of intelligent instruments, it is imperative for instructors to shift from "instructor" to a new role called "human-computer co-navigator. The effective grammar checking and vocabulary optimization capability of the AWE system or artificial intelligence feedback engines has made teachers no longer a single object of language-related evaluation [3]. The findings suggest that instructors shift responsibility for grading superficial errors over time to the machine while placing greater emphasis on student writing processes, logical structure, argument quality, and emotional engagement, as "high-level feedback providers" and "learning process guides" [1]. Meanwhile, teachers also play a new role as "mediator of technology" and need to explain to their students the logic behind an AI's feedback, check whether it is correct, and let students thoroughly revise several times. In this way, we can emphasize that a teacher's role in understanding contexts and suggesting strategies cannot be replaced by an AI system [4].

Secondly, the feedback characteristics of AI prompt teachers to build up a "feedback division view, which reshapes the connotation of anti-authority. The delayed and subjective features of teachers' feedback in traditional writing teaching are magnified by comparing it with the immediate, objective, and quantifiable feedback of AI [5]. According to the results from the literature, it is obvious for the teachers about the benefits of using AI for solving regular languages issues, while explicitly recognizing that they were useful to them professionally for some of the complexities around content and logic, and writing for critical expression, it is possible to form an "AI dealing with surface errors+teacher focusing on deep abilities" cooperative mode [4]. This mindset shift is not only a reflection of the conscious recognition of the limits of technology by teachers, but it also reinforces teachers' sense of professional identity in fostering higher-order thinking skills [13].

Thirdly, the interference from AI prompts teachers' active updating of their estimation of learners' capacities and encourages them to rethink the nature of language learning. Firstly, teachers note the increase in frequency of students' revisions and the improvement in their motivation to write with the help from AI, thus, once again acknowledging the possibility of student self-direction in their learning; meanwhile, too much dependence of students' on AI feedbacks and shallow thinking also provoke teachers to reflect on "empowerment by technology vs. weakness in ability" paradox [9,13]. In such process, teachers' beliefs form a loop "consolidating–questioning–rebuilding": technology's benefits lead to their recognition of pedagogical utility of AI. At the same time, the limitation on the technicality for culture sensibility and intention analysis of discourse prompts teacher to reconsider their special role as a human teacher in emotion support and value guidance [7]. Overall, these research results are consistent with Kessler's viewpoint that artificial intelligence is prompting a multi-level core belief reformation among TESOL teachers [6]. Specifically, the three dimensions of reset - the reconfiguration of professional roles, the redefinition of teacher authority, and the rethinking of the essence of language learning. This process reinforces and showcases the characteristics of the continuous advancement of teachers' professionalism in the digital age.

3.2 Response to RQ2: What factors facilitate or hinder teachers' adjustment of teaching beliefs in the AI environment?

Based on the literature review above, the author finds that teachers' changes in their teaching beliefs are not triggered by a single factor; instead, they result from the combination of individual characteristics, technical characteristics and organizational support. All three factors are positively motivating or negatively inhibiting, and jointly determine the direction of belief evolution. For instance, organizational support can alleviate teachers' personal anxiety towards artificial intelligence, while positive student feedback can enhance teachers'

trust in technology. On the contrary, a lack of technical training may exacerbate the negative impacts brought about by cultural resistance to artificial intelligence, thereby hindering the adjustment of beliefs.

3.2.1 Personal factors: The core internal driving force for belief adjustment

The prerequisite of belief transformation is teachers' trust in AI, which depends on their attitude towards technology. Studies have found that when teachers believe the accuracy of AI feedback is high. They feel that it has a strong ability to alleviate teaching workload, then teachers will be more likely to develop favorable perceptions and make active changes in instruction [8]. In contrast, instructors who worry that their AI feedback could be wrong, is not culturally sensitive, or cannot grasp what is really in a text tend to be wary of tech and sometimes reject it outright [7]. Simultaneously, teachers' technical competence and prior experience have an impact on the transparency of their belief: teachers who are digitally competent who have been trained on AI, or who have good experience of using them would be more willing to embrace the technology and modify their previous assumptions; and teachers who have technical anxiety/unfamiliarity with AI/negative experience of using it will be prone to follow old beliefs [12,17].

3.2.2 Institutional and technical factors: external supporting conditions for belief adjustment

School-level institutional support is the core guarantee of belief change. Institutions with stable facilities, specialized training, teaching materials, and explicit policy guidance to provide a safe technology experiment field for teachers, reduce integration costs, thus promoting the development of positive beliefs [12]. When training is lacking, the technology is obsolete, time is limited, and/or administrative backing is absent, teachers are more likely to see the implementation of AI as a burden on top of their existing workload and to doubt the usefulness of such technology [8]. The nature of AI technology itself also has a direct impact on the direction of belief: tools whose functionality is fixed, simple use, and applicability in instructional settings (e.g., very focused AWE tools) will probably be perceived as such by educators; whereas complicated use process, uncertain response and/or unrelated-to-teaching design of technologies would reinforce teachers' resisting perceptions [3,14].

3.2.3 Cultural context and student behavior: dynamic regulatory variables for belief adjustment

Value orientations are shaped by teaching cultural traditions, which in turn shape beliefs: In an educational environment with standard test orientation and grammar correctness focus, instructors are more concerned about the language correction capability of AI and more prone to hold the "technology helps improve effectiveness" technology-orientation belief; but in a teaching setting valuing critical thinking and creative writing, teachers expect more from the AI's text feedback capability and are more aware of its shortcomings [6,7]. In addition, the teacher's observation on students' usage behavior is a dynamic feedback for updating their beliefs: if they observed that AI could promote students' self-directedness and learning intention, they will strengthen good beliefs; and if they observed that students over-rely on the use of AI without critical thinking, they will reproduce and doubt the pedagogical value of the technology [9,13].

3.3 Response to RQ3: How do changes in teachers' beliefs further influence classroom practices and the integration of technology?

The results of the studies mentioned above indicate that teachers' changes in belief directly affect how much (and how) they use AI tools in class, thereby changing the teaching process, interaction patterns, and learning culture, in turn forming a "belief-behavior-practice" chain-like influence route.

First, positive beliefs drive proactive behavioral adjustments and active integration strategies. Teachers hold positive beliefs about AI are likely to integrate AI profoundly in the whole process of writing teaching: guiding students using AWE for correcting the first draft by themselves, using AI feedback as discussion material in class, and grouping the learners for comparing the differences of AI and teacher feedback, or applying AI in the role of formative assessments [6]. These instructors see AI as a "learning partner"; they believe technology could provide students with a "low-risk learning space" and improve their willingness to express and the depth of modification [4]. For instance, some university ESL teachers employ an AI intelligent tutoring system for designing tiered tasks and adjust the teaching supports according to students' ability in a dynamic way, and pursue personal pedagogical objectives [5].

Second, negative beliefs trigger defensive behavioral tendencies and restrictive integration strategies. Skeptical teachers often tightly constrain contexts where technology can be applied: only assign AI-related tasks out of class, through restricting their usage rate, or through forcing the student to read part of an AI's answer [9]. Their primary fear lies in their belief that technology could interfere with the classroom rhythm, destroy the students' independent thinking ability and jeopardize the professional authority of teachers [14]. These educators continue to use an old-fashioned teacher-centered approach when delivering instruction and utilize AI merely as a supplemental resource instead of a primary component of their teaching, and the latent power of technology is not unleashed [8].

The more profound effect is to systematically change the teaching model. In addition to after the belief change, part of the teacher breaks through the old pattern of "feedback by teachers", and creates a new "three-participant interactive pattern between teachers, students and AI": students finish the first draft revising and finding out problems by AI's help and the teacher explains commonly-occurring problems, supporting higher-level thinking, and individualized assistance to create an integrated system in which "technology does the shallow work," teacher-led deep development" [1,4]. Second, such a belief change also influences how teachers understand academic integrity and classroom authority structures: teachers with open beliefs pay more attention to cultivating students' technical ethics and critical use ability. In contrast, teachers with conservative beliefs focus on rule limitations and teachers' controlling rights for maintaining the class balance [9]. This difference ultimately results in divergent impacts of the AI technology on each classroom as "enablers" (those who leverage AI to transform teaching and learning) [17].

4 Discussion

4.1 The deep mechanism of AI's impact on teachers' core beliefs

This paper identified that the impact of AI on TESOL teachers' teaching beliefs is reflected in three aspects: role reconstruction, feedback idea creation, and re-understanding of the learning essence. The author can illustrate the 'belief filtering' mechanism proposed by Borg in this study as follows: Teachers do not fully accept the AI feedback. Instead, based on their deep belief that 'thinking cultivation is the core', they filter and adopt the AI's assistance in language form while being vigilant about its deficiencies in content logic [10]. This is

precisely a belief-driven cognitive selection process. On a role conversion level, software such as AWE would take over surface-level grammar and language revision, leaving more room for teachers' focus on developing students' higher-order skills. Such a "division-of-labor mindset" implies that the teacher's professional identity needs to be redefined [4]. As Warschauer & Xu pointed out, in the AI era, teachers' professionalism is no longer reflected in knowledge monopoly, but more in those aspects where they can't be substituted by technology, such as context interpretation, guidance on strategy, and emotional support [1].

The change of the concept of feedbacks from "teacher-centric" to "technology-teacher partnership" represents the dynamic adjustment process of teachers' beliefs, where the "belief filter" mechanism proposed by Borg plays an important role; Teachers do not completely accept or deny the value of AI's feedback, they only filter out the value of technology according to their teaching experiences [10]. Wilson & Roscoe also found that teachers had high recognition of AWE grammar feedback but were wary of the discourse content feedback [5]. The different attitudes reflect the effect of the belief filter directly. Such a collaboration feedback model captures the efficiency and objectivity advantage from AI as well as preserves the teacher's professional judgment for tackling complicated issues, becoming a good example of the use of technologies.

The change in teachers' understanding of the nature of language learning reveals the central role of AI serving as a "trigger of cognitive conflict. Coexistence of enhanced learner's motivation to learn and potential over-reliance caused by AI-driven empowerment pushes instructors into the cognitive paradox between "technological empowerment" and "capability degradation" [13]. This paradox leads to the "strengthen-doubt-reconstruction" process of teacher's belief, which forms a more dialectical understanding of technology eventually. Longitudinal tracking research by Kessler indicates that such a reconstructed belief is more stable and flexible and can help teachers better balance the relationship between applying technology and developing abilities in the AI environment [6].

4.2 The multi-factor interaction mechanism of belief changes

The four main influencing factors found in the present investigation – people, technology, institution, and culture – have some kind of theoretical correspondence to the technology integration model proposed by Ertmer, while also shedding light on the distinctiveness of teachers' belief formation during this AI age [11]. The central personal factor, technology trust, is highly context-dependent in its formation process: Teachers are not only concerned with the correctness of AI feedback, but they also care about the transparency and cultural appropriateness of the technology [7]. In their study on this topic, Zimotti et al. discovered that teachers' trust level in generative AI was usually lower compared to the AWE system due to the main reasons that the former's feedback logic was not transparent enough, and there would be possible plagiarism risks [9]. This result points to an unambiguous technological design prescription:

The relationship between technical features and organizational support can also affect the effectiveness of changing beliefs. As found by Ertmer et al.'s study, simply providing technology tools with no related training will not effectively change teacher beliefs [12]. This study also discovered that the specific requirements of AI teaching training should include three aspects: technology application, curriculum design, and moral values, to be able to improve the teachers' technical literacy and belief openness [17]. Moreover, the flexibility of the technology used is equally important. Aldosemani et al. argued that AI tools that are simple to use, offer accurate feedback, and are easily integrated into current pedagogical practice will be more likely to receive teacher acceptance and facilitate change in beliefs [3].

The environment (culture) and students' behaviour represent the active regulative parameters in terms of change in a belief: it is what makes the teacher's beliefs context-

sensitive. In a standardised test-oriented EFL setting, it is likely that teachers would be more interested in the grammatical error-checking capacity of AI, developing technology-related beliefs for effectiveness [7]. Within a classroom context which emphasizes development of critical thinking skills, teachers' expectations are higher regarding AI's high-order ability support [6]. The student behaviors act as a direct feedback signal that determines the direction in which teacher beliefs should be updated: if seeing students use AI to improve their self-directed learning capability, teachers would reinforce positive beliefs; whereas, over-reliance of students' behaviors on AI will cause belief fluctuation, which prevents the teacher from ever being overly confident and set in its ways [13].

4.3 Insights from the linkage of beliefs and practice in teaching transformation

The dominant influence of teachers' beliefs on their teaching practices not only validates Borg's "Belief-Practice Consistency Theory", but also further reveals that in the AI environment, this consistency is achieved through the key mediating variable of 'technical trust', further refining the action path of Borg's theory in the context of intelligent technology [10]. It reveals different tracks for integrating technologies under the AI age, where the fundamental merit of the "proactive integration approach" with optimistic beliefs is to create a tripartite interactive ecology of "teachers-students-AI," which does not only increase the teaching effectiveness but also changes the teacher-student relationship in class [1]. The teacher changes from one-way authoritative guidance into a two-way interlocutor. At the same time, the learners can learn and speak out more independently and autonomously with the help of AI technology. It is in line with the modern language teaching's learner-centered idea.

The presence of restrictive integration strategies indicates a slow, complex nature to the technology integration process. Some teachers are conservative because they have fears concerning the impact that technology may have on their teaching quality and professional authority [14]. It is a reminder for us in the process of advocating for technology promotion: do not forget about the psychological adaptation of teachers on this issue. Research by Hellmich reveals that if the teacher has a good environment for exploring autonomy and is provided with adequate professional support, it will be effective in reducing his/her anxiety about technology and gradually moving from a restrictive to an active strategy [8]. Thus, the order of technological introduction is "respect the belief, provide help, and optimize step by step," rather than enforcing an identical one-size-fits-all model.

The change in classroom ecology from "teacher-centered" into "multi-centered interaction" is the most profound practical effect of a changed belief, which will not only affect the process of teaching as well as the way of interaction but also the essential relation between teaching and learning: the student's ability of autonomous learning has improved greatly, while teachers' professional values are manifested through learning designs, guiding thoughts, and caring feelings [4]. Wilson & Roscoe's empirical results reveal that such a multi-centered interaction pattern may jointly improve the students' linguistic competence and reasoning skills, demonstrating the pedagogical merit of a belief-based instruction map [5].

4.4 Theoretical contributions and practical implications

The theoretical contribution of this paper is mainly reflected in building up a three-layer mechanism model of teachers' belief change in the AI era, which is based on Borg's teacher cognitive theory and Ertmer's technology integration model that reveals a full action chain "characteristics of technology triggers - choose cognitive filter - context factor regulation" [10, 11]. This model can explain not only the influence mechanism of AI on teachers' beliefs,

but also provide some theoretical tools for the prediction and guidance of teachers' change in beliefs, enhancing findings of studies on technological pedagogical content knowledge and teachers' beliefs.

On a pragmatic level, the four recommendations in this study are clearly targeted and operational. Teacher education must go beyond teaching how to operate technically and instead focus on developing technical reasoning as well as critically using technical operations, supporting educators in mastering the relevant limits and ways to integrate AI-based tools [17].

The development of the AI technology needs to increase its transparency and explainability and raise teachers' trust via approaches like intuitive feedback logic or better cultural fit [3]. At the classroom level, the "AI-teacher collaborative feedback model" proposed therein needs to be flexibly adjusted based on teaching objectives and students' characteristics to determine the ratio between AI and the teacher's responsibility. At the same time, the ongoing assistance at the school level is a long-term assurance that can only be realized by guiding policies, resource provision and time assurance that fosters an enabling context for teachers' change in beliefs and practice [12].

These findings collectively indicate that the transformation of English teaching in the AI era is not a process of technology replacing teachers, but a process of collaborative optimization between technology and teachers. Only by fully respecting the core role of teachers' beliefs and providing multi-dimensional support to help teachers achieve synchronous upgrading of beliefs and practices can the educational value of AI technology be truly realized and promote TESOL teaching to develop in a more efficient and personalized direction.

5 Conclusion

This paper follows the PRISMA 2020 guidelines for reporting systematic reviews and analyzes in detail how the implementation of AI-aided English instruction affects TESOL instructors' instructional beliefs, based on 12 empirical papers published from 2015 to 2025. This study finds the change of teachers' fundamental beliefs brought by artificial intelligence, which mainly includes three aspects: professional identity transformation, feedback idea innovation, reconceptualization of language learning and guiding teachers' transformation from knowledge transmitters into learners' facilitators and technology mediators. Teachers' change in beliefs depends on several variables, including their own technology literacy level and features of the AI tool, institutional support and culture, and change in beliefs determines how deep and how the technology is integrated, leading to two common practice streams, which call "active integration" and "restricted integration." The "technology triggering – cognitive filtering – context regulation" tripartite mechanism model built up by this paper offers a comprehensive theoretical framework to explain the change of teachers' beliefs under the AI era.

This study has three limitations: Firstly, the included literature only covers empirical studies in Chinese and English, which may miss other language-related results; Secondly, the sample size of the 12 studies is limited, and they are mainly cross-sectional studies, making it difficult to reflect the long-term dynamic changes in beliefs; Thirdly, the differences in the impact of different AI tool types on beliefs have not been deeply compared.

Further studies may improve in three directions: (1) extend the selection criteria for including more literature written in other languages as well as grey literature in order to increase the coverage of the study. (2) carry out longitudinal tracking researches to show the development path of teacher's belief under a long-term AI teaching practice. (3) pay attention to particular areas, comparing the difference between various teaching situations, teachers group and type of AI tools, and develop specific teacher training intervention programmes in

order to test the validity of practical implications and provide further actionable insights for the deeper integration of AI and English instruction.

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