



Indonesian pre-service teachers' changing beliefs about cognitive strategies during online English practice

Ririn Pusparini,^{1*} Ali Saukah,² Widyastuti,¹

¹Universitas Negeri Surabaya, Indonesia, ²Universitas Muhammadiyah Kalimantan Timur, Indonesia

Technological competence remains a highly recommended skill for teachers, their beliefs about cognitive strategies can significantly influence the integration of technology in online teaching practices. This study aims to investigate the beliefs of pre-service teachers (PSTs) regarding cognitive strategies during online English teaching practices. Specifically, it explores the beliefs held by PSTs prior to their teaching practicum in schools and the subsequent changes in these beliefs during the practicum. To gain deeper insight into the nature of these beliefs, a qualitative research methodology was employed. Data were collected through semi-structured interviews, online classroom video observations, and questionnaires. The study involved 36 fourth-year PSTs from the Language Education Study Program at a public university in Indonesia, with 8 of them participating in the interviews and classroom observations. The findings reveal that PSTs' beliefs about cognitive strategies changed notably in relation to promoting communicative, problem-solving, and student-centered activities. Partial changes were observed in beliefs related to the use of learning videos, the use of the target language in class, and speech pacing. In addition, the findings indicate that changes in beliefs were largely influenced by IT infrastructure, which affected time allocation for teaching and the selection of teaching platforms dictated by school policy. Moreover, PSTs' limited IT competencies and the lack of effective monitoring of students' activities, conditions, and behaviors were identified as key constraints shaping their beliefs during online teaching. Therefore, it is recommended that school mentors and teacher education programs support PSTs in reshaping their beliefs, particularly in relation to online teaching practices. Moreover, teachers and students require comprehensive support from parents, schools, the government, and the broader community to achieve learning objectives and foster effective online classrooms.

Keywords: pre-service teachers, belief, cognitive strategies, online practicum

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*Correspondence:

Ririn Pusparini

ririnpusparini@unesa.ac.id

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INTRODUCTION

Research on teacher beliefs supports the notion that such beliefs have a positive influence on classroom practices ([Saputra et al., 2020](#); [Farrell & Guz, 2019](#)). Previous studies consistently suggest that teachers' underlying beliefs shape classroom interactions and patterns, decision-making processes, the roles of both student and teacher, the selection of materials, instructional goals, and teaching procedures. However, these beliefs are not static; they may change or become misaligned with actual practices due to various influencing factors. One significant factor is the socio-educational context, which encompasses aspects such as class size and

composition, as well as broad educational conditions, including exam-related pressures and national educational policies (Nishino, 2012).

Issues related to distance, remote, or online learning are not new, as numerous studies have reported how documented how online learning or instruction has been implemented alongside technological advancements in the 21st century (Hockly, 2015; Badia et al., 2017; Gonzalez & St.Louis, 2018; Shin & Kang, 2018; Blaine, 2019; Xu & Zhou, 2020). This development highlights the significant role of the Technological Pedagogical Content Knowledge (TPACK) in teaching and learning, as its framework illustrates the dynamic interplay among three essential knowledge domains; pedagogy, content, and technology (Mishra & Koehler, 2006). Thus, the current educational landscape presents substantial challenges for teachers in terms of developing technological competence and effectively integrating technology with pedagogy. Even after the Covid-19 pandemic, teachers are still strongly encouraged to utilize emerging information and communication technologies (ICT) in their instructional practices. In other words, teachers are expected to enhance teaching and learning by integrating ICT to complement traditional classroom practices in language education (Arrosagaray et al., 2019; Saboowala & Manghirmalani Mishra, 2021). Some scholars have referred to these approaches as the new traditional model or the new normal in education (Dziuban et al., 2018; Rasheed et al., 2020). Accordingly, schools have the authority to implement various forms of online teaching environments, such as hybrid, blended, or fully online learning. Essentially, these types of learning offer comparable online learning experiences, as Badia et al. (2017) note that approaches to online teaching are also applicable to both blended and hybrid learning formats.

Meanwhile, inadequate IT infrastructure, limited knowledge of online teaching, and lack of access to electronic devices have become significant challenges for both teachers and students in remote education (Yi & Jang, 2020). Consequently, as agents of change, teachers are expected to address these challenges to ensure and maintain the teaching quality (Pu, 2020). Furthermore, teachers' beliefs about cognitive strategies play an important role in supporting the integration of technology into teaching practices, particularly in online learning environments.

As future teachers, PSTs are also expected to develop the ability to identify and apply suitable instructional strategies within learning environments that are fully or partially web based. If teacher education programs fail to adequately prepare them for online instruction, this could present a major obstacle. Various constraints may prevent them from translating their beliefs into actual classroom practices (Farrell & Bennis, 2013). Furthermore, scholars have noted that mismatches often occur when teachers' beliefs do not align with their practices. Figure 1 illustrates how contextual factors—such as the educational setting - can influence the cognitive beliefs of teacher candidates during teaching practicums. At the same time, these beliefs are shaped by the teacher education program and the candidates' prior learning experiences before entering the practicum phase.

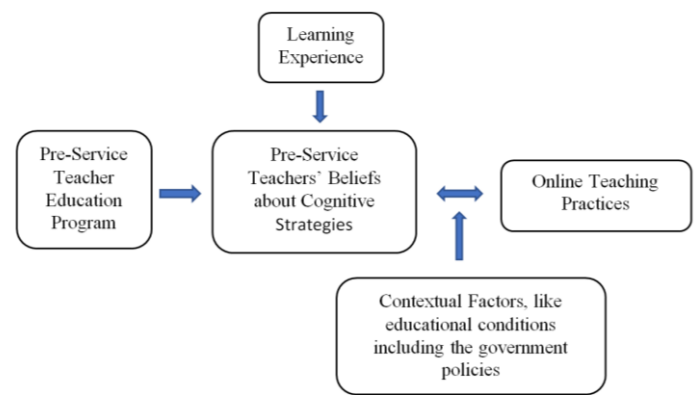


FIGURE 1 | A Conceptual Model of Pre-Service Teachers' Beliefs and Teaching Practices (Adapted from Borg, 2015)

As a type of instructional strategy, cognitive strategies involve the mental processes employed by PSTs to manage classroom interactions. These include monitoring students, analyzing both teacher and student actions, setting new instructional plans, and adjusting learning goals (Heikonen et al., 2017). PSTs observe what occurs in the classroom, interpret these events, and modify their instruction accordingly. Meanwhile, Wolff et al. (2015) found that PSTs tend to offer more superficial interpretations of classroom events compared to experienced teachers and often struggle to process information efficiently or adapt lessons appropriately. Thus, Saariaho et al. (2015) suggest that cognitive strategies can be particularly beneficial for PSTs in addressing the classroom challenges and in supporting students' learning strategies. These challenges become even more complex in online contexts, where technology is not only a medium for delivering content but also a crucial tool for facilitating teacher-student interaction (Richmond et al., 2020).

Several studies have investigated the implementation of cognitive strategies in classroom settings. For example, Pu (2020), Mahmood (2020), and Bao (2020) proposed various cognitive strategies in context of online teaching practices. However, these studies did not delve into the mental processes teachers engage in when managing unplanned events during online classroom interactions. In other words, they did not provide a comprehensive understanding of how teachers interpret unexpected occurrences in online teaching, the strategies they employ in response, or how they modify their instruction accordingly. In contrast, Heikonen et al. (2017) conducted a study to better understand the strategies, including cognitive ones, that PSTs use during classroom interactions in the context of teaching practicums. Their research focused on PSTs' use of cognitive strategies by having them observe and reflect on teaching videos situated in face-to-face classroom environments. Therefore, the exploration of PSTs' beliefs about cognitive strategies and their application during online teaching practices remains relatively under-researched.

As demonstrated by preliminary study results, teacher education programs in Indonesia have made efforts to prepare PSTs for teaching in online learning environments. This preparation is essential, as PSTs are expected to meet the demands of 21st-century education by integrating technology

and pedagogy effectively in classroom settings. This aligns with the assertion of [Kennedy and Archambault \(2012\)](#), who emphasize that PSTs must possess the competencies required to teach in online environments, and that teacher education programs should be designed to support this goal. Consequently, prior to their placement in actual teaching contexts, PSTs are trained to acquire relevant knowledge and engage in teaching simulations that involve the use of educational technology. Such training aims to equip them with the necessary skills to navigate the complexities of online classroom interactions, particularly given their limited practical experience.

Meanwhile, the challenge becomes increasingly complex when IT infrastructure poses a significant problem, especially in developing countries such as Indonesia. However, teacher beliefs can play a pivotal role in enabling them to apply strategies that integrate technology with pedagogy, as these beliefs influence teachers' awareness, attitudes, methods, techniques, and instructional policies ([Doğruer et al., 2010](#)). Previous studies have emphasized that greater attention should be given to teachers' beliefs about cognitive strategies rather than solely focusing on their implementation in online learning contexts. This is because beliefs guide the actual use of strategies as reflected in teachers' classroom behavior. For instance, if pre-service teachers (PSTs) do not believe in the value of cognitive strategies associated with the use of specific online platforms, they are likely to be reluctant to use them in practice. When they are required to do so due to institutional demands or contextual constraints, they may experience demotivation, frustration, and uncertainty. These conditions underscore the importance of investigating PSTs' beliefs about cognitive strategies, as well as how these beliefs evolve, in order to support the creation of optimal online learning environments. Such an understanding is essential for enabling PSTs to manage, regulate, adapt to, and respond effectively to diverse online classroom scenarios during their teacher education.

The importance of cognitive strategies for successful online learning sessions has inspired the present study to examine PSTs' beliefs about these strategies. This study explores the beliefs demonstrated during online teaching practices and the processes that lead to changes in these beliefs. Accordingly, the study poses the following research question:

- Do the beliefs of PSTs about cognitive strategies change during online teaching practices? If so, how do these changes occur?

METHODS

Research Design

This study aimed to investigate the evolving beliefs of pre-service EFL teachers regarding cognitive strategies during online teaching practices. To achieve this objective, a qualitative research methodology was employed to gain deeper insights into the nature of PSTs' beliefs before and during their teaching experiences. Qualitative methods are particularly suitable for capturing the complexity of phenomena such as emotions and belief systems ([Creswell, 2016](#)).

An explanatory design was applied in this study. Initially, survey data were collected before and during the teaching practices. This was followed by a multiple or collective case study, serving as a qualitative approach to explore the survey responses in greater depth ([Creswell, 2016](#)). Moreover, online classroom observations and interviews were conducted to trace moment-by-moment changes in the cognitive strategies employed by PSTs.

Participants

The study recruited 38 pre-service teachers from the English department of a public university in Indonesia. The participants were in the fourth year of their bachelor's degree program and had completed several university courses related to English Language Teaching (ELT). They engaged in a four-week teaching practicum at various schools in Surabaya. To obtain rich and meaningful data, eight potential participants were invited for interviews and classroom observations. These participants were selected based on three criteria. First, they were conducting their English teaching practicum at the secondary school level (junior high schools, senior high schools, or vocational schools). Second, they were involved in teaching activities either individually or in groups, allowing for an examination of how their beliefs influenced their teaching practices. The third criterion was their willingness to fully participate in the study, which was essential for collecting in-depth and comprehensive data.

Prior to the practicum, all participants underwent a teaching simulation that emphasized the use of technology in an online teaching environment. The school-based teaching practices were conducted in online settings, employing hybrid or blended learning models due to the post-pandemic context. It was assumed that the participants would apply their beliefs about ELT and utilize cognitive strategies during the implementation of their teaching practices.

Instruments

This study employed three instruments for data collection: questionnaire forms via Google Forms, observation sheets, and interview protocols. The questionnaire was used to address research questions, which focused on the beliefs of PSTs about cognitive strategies before and during their online EFL teaching practicum. The study developed a Teacher Beliefs Questionnaire, primarily based on the work of [Woodcock and Reupert \(2013\)](#). Specifically, all ten cognitive strategies proposed by Woodcock and Reupert were adopted, as they were deemed relevant to the context of the present study.

The questionnaire consisted of 10 statements reflecting students' beliefs about cognitive strategies, rated using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). It was administered twice to capture changes in beliefs over time: first, before the participants began their teaching practice in the cooperating schools, and again after they completed the four-week practicum.

Observation sheets were also used to analyze videos of the online teaching sessions. A total of sixteen teaching videos were collected and analyzed to help answer the research questions. Additionally, eight students (4 male and 4 female) participated in semi-structured interviews.

Data Collection

The study was conducted from September to December 2023. Data were collected through the distribution of questionnaire, the recording of online teaching practicum sessions, and the conduction of interviews. Before and after the teaching practicum, the PSTs were asked to complete a questionnaire, which required approximately 3-5 minutes to complete.

Meanwhile, the study recorded the online-teaching practicum sessions. During the observations, the researchers took notes on the PSTs' beliefs about cognitive strategies as reflected in their teaching practices. Based on eight selected recordings and the accompanying notes, the researchers then compiled observation accounts. Furthermore, a 20-minute online semi-structured interview was conducted with each of the eight PSTs following the practicum. Although the interviews were conducted in English, participants were encouraged to use Indonesian when necessary to express their beliefs about cognitive strategies and the processes underlying any changes in those beliefs more clearly. Additionally, they were prompted to describe the challenges they encountered and the types of support they required. All interviews were audio-recorded and transcribed for analysis.

Data Analysis

After the data collection phase, several systematic procedures were undertaken to analyze the data gathered from the three instruments: questionnaires, classroom observations, and interviews. First, the data from the pre- and post-practicum questionnaires were analyzed to determine whether any changes had occurred in the PSTs' beliefs about cognitive strategies during their online teaching experiences. These questionnaires served as the basis for identifying shifts in beliefs before and after the practicum and provided a comparative framework for understanding the impact of the teaching experience. Second, the classroom observation data were thoroughly examined. The researchers repeatedly read the observation accounts, re-watched the recorded teaching videos, and focused on the activities and interactions between teachers and students. All observational data were transcribed and organized according to the participants' names, rather than being categorized as pre- or post-practicum. This method facilitated the identification of specific cognitive strategies used by the PSTs throughout the online teaching practicum.

Third, the interview data were analyzed through an iterative process. The research team repeatedly listened to the recorded interviews and reviewed the transcripts carefully. The participants' teaching and learning experiences were then documented in the form of concise narratives. These narratives were classified by participant names and shared with the respective participants for verification. Revisions were made based on their feedback to ensure the accuracy and clarity of the interpreted beliefs and experiences. This step was essential for exploring both the beliefs held by the PSTs and the processes that contributed to changes in those beliefs. Finally, after all the data from the three instruments were coded, the results were compared and synthesized to produce a set of qualitative findings. These findings were interpreted through the lens of the researchers' perspectives, contextual analysis, and comparisons with previous studies. The integrated analysis provided nuanced insights into the PSTs' cognitive strategies and addressed the research questions comprehensively.

RESULTS AND DISCUSSION

This section elucidates the beliefs of PSTs regarding cognitive strategies and their online teaching practicum. A total of ten cognitive strategies emerged from the analysis of questionnaires, teaching practicum videos, and interviews. The comparison of participants' beliefs, as reported in the pre- and post-practicum questionnaires and analyzed through an independent-sample t-test, revealed an interesting finding: no statistically significant differences ($p \geq .05$) were found between the pre- and post-practicum responses across most subsections of the PSTs' beliefs (see [Table 1](#)). Therefore, qualitative data drawn from interviews and field notes based on video observations were employed to further explore whether changes in the PSTs' beliefs about cognitive strategies occurred during the online EFL teaching practicum and, if so, how these changes took place.

TABLE 1 | Beliefs of Pre-Service Teachers about Cognitive Strategies Before and During the Online EFL Teaching Practices

The Result of the Questionnaire				
No.	Beliefs of Pre-service Teachers about Cognitive Strategies	Pre (mean)	Post (mean)	Significance Difference N=36
1.	I use video or audio materials to help me deliver the content and support student learning.	4.1	3.9	.20
2.	I provide online class recordings to benefit students who missed or did not understand parts of the lecture.	3.7	3.7	.86
3.	I emphasize real-life communicative contexts and problem-solving activities.	3.9	3.5	.04
4.	I modify the materials to meet students' learning needs.	4.1	4.1	1.0
5.	I make emergency preparedness plans for unexpected problems.	3.8	3.7	.66
6.	I combine online learning with offline self-learning.	3.7	3.8	.36

7.	I slow down my speech to help students to grasp key knowledge points.	4.3	4.2	.59
8.	I use the target language to explain the materials in class.	3.5	3.1	.02
9.	I ask challenging questions during online classes.	3.4	3.6	.45
10.	I show flexibility and give extra time to students for submitting assignments.	4.1	4.1	.72

The results explicitly demonstrate that, out of the ten cognitive strategies believed in by the participants, only two exhibited statistically significant differences (see [Table 1](#)). Although these strategies were introduced during teacher education, the actual teaching experience evidently provided the participants with a clearer understanding of the importance of applying them in practice. This finding aligns with [Busch's \(2010\)](#) assertion that teaching experience during practicum helps pre-service teachers (PSTs) connect their theoretical learning in teacher education to real classroom setting.

Moreover, the study observed a significant change in the belief related to emphasizing authentic communicative context and problem-solving activities ([Table 1](#), No. 3). This result is supported by the initial interviews, in which many participants reported that this strategy was motivating and actively engaged students in classroom interaction. PST3 explained her support for the strategy: “*Students have to practice their English; hence, I will apply the strategy to give time for them to use the language*”.

However, the majority of the PSTs were found to be strong advocates of providing extensive explanations of teaching materials during their practicum. As PST8 stated: “*The strategy took much time while I had only not more than 70 minutes to teach the class, then it was sufficient only for explaining the materials and small discussion*”.

The result also revealed that most participants appeared to experience difficulties in engaging students in classroom discussions. Many students remained silent, often turning off their microphones and cameras. Consequently, the participants' roles became dominant, resulting in a teacher-centered rather than student-centered learning environment.

“*It was difficult to monitor and involve students in an online class because most of them turned off the microphone and camera. I even did not know they stayed with me or not during the meeting hours.*” (PST2, interview).

The inconsistency between the reported beliefs and actual practices of the PSTs highlights that, while they theoretically supported the use of actual communicative contexts and problem-solving activities, in practice, they tended to adopt more traditional teaching methods by allocating significant time to explaining the materials. One major constraint was the limited duration of each class session - PSTs effectively had only 70–75 minutes of teaching time instead of the scheduled 90 minutes, as they needed to wait for all students to join the online class. In some cases, more than 15 minutes were required before all students were actively involved. This situation led to a teacher-centered approach, where the PSTs dominated the class interaction. This pattern aligns with the findings of [Saputra et al. \(2020\)](#) and [Capan \(2014\)](#), who observed that tight schedules and the pressure to cover a wide

range of topics within the curriculum often influenced teachers to believe that student-centered strategies were too time-consuming. As a result, PSTs tended to perform more as transmitters of knowledge rather than facilitators of learning ([Chaaban et al., 2019](#)).

In terms of asking challenging questions to students, the result of the questionnaire, which indicated only a slight difference between pre- and post-practicum responses, were inconsistent with the participants' responses during the interviews. While they claimed to have employed the strategy to stimulate student motivation and engagement with the material, only a few actually applied it in practice. Several participants admitted that the classroom conditions often compelled them to focus more on delivering the material rather than facilitating interactive activities. Some participants reported that even when they encouraged students to ask questions – regardless of whether the questions were challenging – the students often remained silent. As PST4 clarified,

“*After explaining the materials, I always asked students if they had questions. However, I was always disappointed because they always said “no” and even gave me no response. As a result, I was the one who gave the question.*” (PST4, interview)

Additionally, PST1 emphasized the following:

“*Because there was no question from students, the class mentor gave me a question. It was done to encourage students to involve actively in a class or to give an example of how the question should be delivered.*” (PST1, interview)

A number of studies ([Chin & Osborne, 2008](#); [Wu et al., 2023](#); [Mcqueen, 2024](#)) assert that students' questions play a crucial role in promoting meaningful learning and fostering scientific inquiry. However, the findings reveal that students' reluctance to respond was a significant factor that discouraged the PSTs from implementing the strategy of asking challenging questions. As [Blaine \(2019\)](#), notes, there is often an implicit demarcation of space between teachers and students in online classrooms, which makes it difficult for teachers to monitor students' engagement and participation. Consequently, while the PSTs initially believed they would be able to assess students' understanding through the questions students asked, in practice, they came to rely more on students' responses to the questions posed by the teachers themselves.

The results also reveal that certain strategies underwent only partial change, as not all participants altered their beliefs between the pre- and post-online teaching practices. For instance, the belief regarding the use of the target language in the classroom demonstrated inconsistency between the pre- and post-practicum stages. The interview data indicate that

the participants generally believed that teachers should use English for approximately 70% to 80% of classroom instruction. PST3 described her teaching experience as follows, “*I taught foreign language, and to make students familiar with the language, I had to use it frequently in class.*”

Meanwhile, after completing their teaching practicum, the PSTs reported that they used only 40%-50% of English during instruction. This reduction was primarily due to their concerns regarding students' difficulties in comprehending the instructional content. In practice, the classroom teaching videos revealed that surprisingly, fewer than half of the participants used English at a level approaching 50%. The remaining participants employed English minimally – no more than 25% - while predominantly relying on the students' first language (L1). PST8 explained, “*students asked me to use L1 rather than the target language, especially when I explained the materials*”. In addition, PST4 emphasized the comprehension challenges faced by students, stating, “*when I used the target language in explaining the materials, I always asked students whether they understood or not, and they always said no.*”

The study highlights that students' rejection and reluctance to use the target language may account for the partial changes in the participants' beliefs. The participants appeared hesitant to fully implement English as the medium of instruction, as they perceived that students would struggle to comprehend their explanations. This finding aligns with [Kandilla et al. \(2019\)](#), who reported that while PSTs initially believed that using English would facilitate students' understanding, in practice, students often remained silent when English was used as the primary medium. Similarly, [Turnbull \(2017\)](#) emphasized the necessity of incorporating the first language (L1) for clarification and explanation purposes. Consequently, code-switching emerges as a practical strategy to address students' misunderstandings related to teachers' instructions and learning materials ([Kandilla et al., 2011](#); [Seymen, 2012](#)).

Regarding the belief in slowing down speech during online teaching practices, nearly all participants responded positively during the interviews. This was further supported by the questionnaire results, which showed consistent responses between the pre- and post-practice phases ([Table 1](#), No. 7). The participants emphasized that this belief was particularly influenced by the online teaching context. Representing the group's view, PST4 explained:

“It was online teaching, and bad internet connection happened frequently. Besides, we only used our voice and limited expressions instead of gestures to explain the materials. Thus, we could make students understand our explanations by slowing down our speech.” (PST4, interview)

However, a few participants stated that they would slow down their speech only when they perceived that students were having difficulty understanding the material. Meanwhile, the classroom observation videos revealed that only a few participants slowed their speech during teaching, while the majority maintained a normal pace. They explained that although they had intended to slow down their speech, time constraints compelled them to speak at a regular speed.

As cited by PST6:

“I need to spend more time explaining all the materials. Although I said before that I would slow down my speech, I changed it for I would slow down my speech if students did not get the points of my instructions.” (PST6, interview)

In this regard, time constraints again posed a significant obstacle for participants in implementing the strategy of slowing down their speech during classroom interaction. Addressing the role of teachers' voices in online teaching, [Mahmood \(2020\)](#) emphasizes that teachers should prioritize vocal clarity and modulation over non-verbal cues such as body language, eye contact, and physical gestures. Speaking clearly and gently can facilitate students in noting essential lecture points ([Bao, 2020](#)). Therefore, it is crucial for teachers to develop skills in controlling their speech rate and voice quality to ensure effective learning in the online environment.

Similarly, some PSTs expressed a shared belief in the effectiveness of using video or audio materials as teaching media. The majority agreed that these media are more engaging than teachers' voices alone and help capture students' attention during lessons. For instance, PST2 and PST5 noted, “*Sometimes videos can explain the materials better than teachers.*” However, in practice, some participants did not use video materials during their teaching sessions due to technical incompatibilities between the videos and their teaching platforms. Consequently, they relied primarily on PowerPoint presentations and images. This suggests that the use of video and audio materials in online teaching can be hindered if the platforms do not adequately support such media.

Several studies suggest that during online teaching practices, teachers should prioritize engaging students in tasks and providing access to content rather than focusing excessively on how well the content is designed and delivered ([Debreli, 2012](#); [Egbert, 2020](#)). Another challenge that emerged was students' refusal or reluctance to utilize internet access due to concerns over data quota expenses. This issue became apparent when some participants sent video materials prior to scheduled class sessions, yet only a few students were able to access the videos. To address this problem, it is recommended that the Indonesian government and educational institutions improve infrastructure and provide sufficient facilities to support both students and teachers in establishing effective online classes.

Among the five previously mentioned strategies, the results reveal that the beliefs of some participants regarding certain cognitive strategies remained unchanged throughout the online practicum. Notably, two beliefs yielded particularly interesting findings: providing online class recordings and making emergency preparedness plans. Regarding the provision of online recordings, participants believed that these recordings benefit students who miss class for any reason, ensuring that they do not fall behind. As PST5 explains:

“It was an online classroom, and not all students could join the class due to the electronic devices problem, the unstable connection, and even no internet quota. Then, classroom recording could be very useful for them.” (PST5, interview)

Regarding the teaching videos, the participants consistently recorded each meeting during classroom hours. PST7 stated, "I recorded the teaching practicum and gave the link to Google Drive to the school teacher." This belief aligns with findings by Carmichael et al. (2018) and Trail and Caukin (2022), who emphasize that video recordings of lessons provide realistic views of teaching practices by capturing the authentic nature of classroom instruction.

Similarly, the participants expressed positive beliefs about the necessity of preparing emergency plans, given that internet connection problems pose significant obstacles to effective online classroom interaction. As PST6 explained:

"At the first meeting, I had trouble with my computer; thus, for the following meetings, I also prepared my cellphone and tablet for teaching practices. I was aware that I could not depend on only one tool in online teaching." (PST6, interview)

Moreover, some participants argued that they supported students by providing summaries of the materials. Meanwhile, PST3 explained, "to anticipate the unexpected condition, I have prepared my PowerPoint slides and assignments for students, and also activated a WhatsApp Group." This approach aligns with Mahmood's (2020) recommendation that teachers should develop backup plans, such as plan B or C, to address potential problems without causing delays in student learning.

The participants also expressed a strong belief in modifying learning materials. They argued that compiling materials from various sources, including PowerPoint slides, would be more beneficial. PST4 and PST5 explained, "We modified the materials for the students' needs." This statement corresponds with their use of teaching videos and slides, which demonstrated their ability to compile and adapt materials effectively. Such teaching practices illustrate how teachers' approaches to modifying and utilizing materials significantly impact teaching quality and, consequently, students' learning (Mozetič, 2019; Li & Li, 2021).

In line with the belief of combining online and offline self-learning (Table 1, No. 6), the participants explained that

online classrooms offered greater opportunities for students to engage in independent learning. Consequently, teachers needed to facilitate both online and offline self-learning through appropriate materials. Moreover, the majority of participants agreed that online and offline assignments were suitable for supporting students' self-learning. These beliefs align closely with findings from several studies (Cahyani et al., 2021; Xingjia et al., 2021; Tian, 2023; Rafiee & Gilakjani, 2024), which highlight that online learning – characterized by increased accessibility, relatively low cost, time efficiency, and integration with offline learning – can provide self-paced instruction allowing learners to manage their own progress conveniently. Practically, all PSTs assigned homework through Google Forms or email submissions. Regarding the strategy of giving students extra time for assignment submission (Table 1, No. 10), the participants noted that technical issues frequently arose in the online mode. This belief remained unchanged throughout the teaching practicum, although the outcome was less than ideal. Students appeared to lack seriousness in completing assignments, as reflected in PST2's comment: "students submitted their work a week late, and only 5 out of 35 submitted their work."

The findings indicated that changes in the beliefs of PSTs are significantly influenced by the condition of IT infrastructure, which remains a major challenge in conducting online learning sessions. Therefore, it is essential that the government and schools provide adequate IT facilities. Additionally, PSTs need to effectively manage their time both as transmitters of knowledge and as facilitators to establish effective online classrooms. This situation compels PSTs to change their beliefs fully or partially by adopting certain cognitive strategies during online teaching practices, such as using learning videos to encourage students' self-learning. Furthermore, communicative activities, including asking students challenging questions, can promote a student-centered rather than a teacher-centered classroom. Meanwhile, strategies like code-switching and slowing down speech can enhance students' understanding of the materials. The beliefs of PSTs evolved in response to these challenges, which are illustrated in the following figure 2.

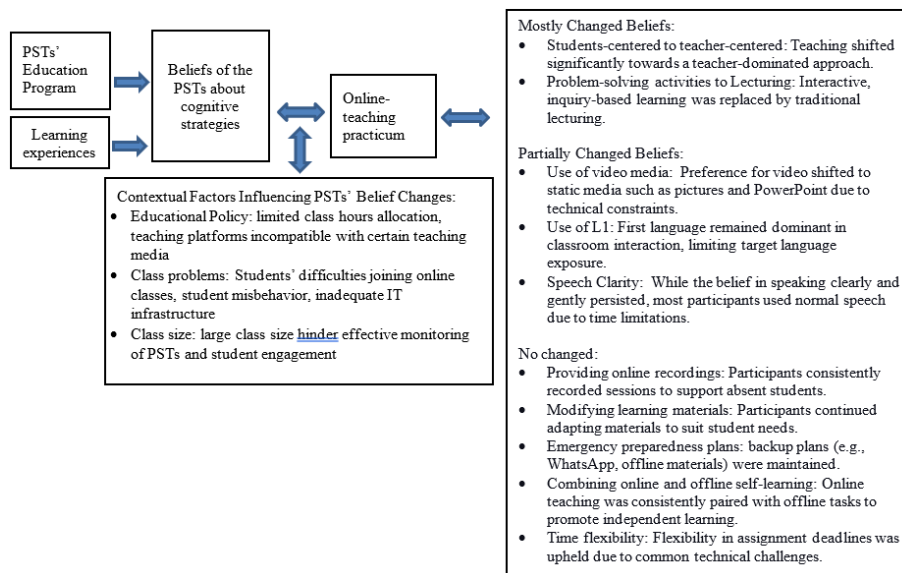


FIGURE 2 | Beliefs of the PSTs about Cognitive Strategies in the Online-Teaching Practicum

CONCLUSION

The present study provides a comprehensive overview of Indonesian pre-service teachers' (PSTs) beliefs regarding cognitive strategies and the extent to which these beliefs changed - or remained unchanged - during online teaching practices. Specifically, the findings reveal that PSTs' beliefs in two cognitive strategies underwent significant change during the practicum. First, their belief in student-centered instruction shifted toward a teacher-centered approach. Second, their belief in problem-solving activities as effective strategies was replaced by a reliance on teacher lecturing. Meanwhile, three other strategies - namely, the use of learning videos, the use of the target language in the classroom, and slowing down speech - experienced partial change. These shifts were primarily attributed to inadequate IT infrastructure, which hindered the effectiveness of online learning environments. In addition to technological limitations, several other factors contributed to the change in PSTs' beliefs, including limited IT competencies, insufficient monitoring during teaching practice, and student-related issues such as misbehavior and lack of engagement. These contextual and experiential elements align with Borg's (2003) teacher cognition framework, as illustrated in Figure 2, underscoring the complex interplay between external conditions and teachers' internal belief systems during the enactment of online teaching.

To achieve successful online teaching practices, PSTs must be able to confront various challenges by becoming thoroughly familiar with technology, monitoring student learning, and fostering both students self-learning and active participation in class activities. Therefore, school mentors and teacher education programs should support PSTs in reshaping their ideas and beliefs, particularly through hands-on experience in online teaching. Furthermore, the government and schools must ensure that IT infrastructure is readily available to both teachers and students to facilitate effective online learning environments. In this regard, teachers and students require full support from parents, schools, the government, and the wider society to attain their educational goals.

Nevertheless, the interpretations drawn from this study should be considered in light of three key limitations. First, the online classroom observations were limited, as each participant was observed in only two sessions lasting 70–75 minutes. More frequent observations could provide richer and more reliable insights into PSTs' classroom practices. Second, the relatively small number of participants may limit the generalizability of the findings, whereas a larger-scale study could offer broader and more nuanced perspectives. Lastly, the specific school context in which the PSTs conducted their online teaching and the characteristics of the learners involved may have influenced the development of the PSTs' beliefs and practices. Future research should consider conducting similar studies across diverse school contexts, with varied learner groups, instruments, and procedures, to gain more comprehensive insights into the evolution of PSTs' beliefs.

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