

# Mediating Language Fluency Development: An Action Research Study in a High-School Chinese Classroom

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**Abstract**—Fluency development is critical in language learning; however, the teacher’s role as a mediator in a learner’s fluency development has been rarely explored in constructive learning classrooms. Under the guidance of Mediated Learning Experience (MLE) theory, this study investigated the extent to which teacher-implemented mediation aided learners’ cognitive and utterance fluency development in one Advanced Placement (AP) Chinese high-school task-based language teaching (TBLT) classroom. MLE theory, developed by psychologist Reuven Feuerstein, provided a mediation framework for this study. The design of this action research followed the test-intervention-test procedure and collected pre- and post-test speaking samples from 21 participants. To investigate the effectiveness of the mediation, three utterance fluency variables that correlate to cognitive fluency development were measured: the number of silent pauses, the number of self-corrections, and mean syllable duration (MSD). The pre- and post-test data showed that both the number of silent pauses and MSD statistically significantly decreased on the posttests, which suggests that the mediation intervention improved learners’ utterance and cognitive fluency. Although the decrease in the number of self-corrections on the posttest was not statistically significant in this study, this finding suggests that self-correction is a variable that may require a much longer time to change.

**Index Terms**—mediation, speaking fluency, Chinese as a second language, teacher’s role, task-based language teaching

## I. INTRODUCTION

Fluency is difficult to achieve (Tavakoli & Wright, 2020), especially for English speakers learning Chinese because the two language families are very dissimilar. Fluency, however, has been a less explored area in second-language teaching (Tavakoli & Hunter, 2018). Tavakoli and Hunter’s (2018) research found that nearly half of the second-language teachers surveyed had limited or very little knowledge of teaching fluency to their students, not to mention how to teach fluency to students in a constructive learning classroom.

Task-based language teaching (TBLT) is a teaching approach derived from constructivist learning theory. It engages learners in meaning-focused communication to develop their communicative-language abilities through performing tasks (Ellis et al., 2020). A task in TBLT carries the goal of communicating meaning and is connected to the real world (Skehan, 1996). Bygate (2015) pointed out that because a task is not a mechanism, the teacher needs to mediate the learners to enter the space created by tasks. However, the role of a teacher as a mediator has only been explored in a few studies (e.g., Ellis, 2009; Van den Branden, 2009; Van den Branden, 2016). No known studies have explored fluency development from the perspective of how the teacher as the mediator helps learners develop their fluency in a TBLT classroom.

Psychologists like Jean Piaget (1896-1980), Lev Vygotsky (1896-1934), and Reuven Feuerstein (1921-2014) all had different understandings of mediation and its role in learning. In Piaget’s (Piaget & Cook, 1952) learning theory, the mediator’s role is to provide a direct learning environment to learners while the child interacts with the environment to learn (Kozulin & Presseisen, 1995). Vygotsky (1978) explored how society mediates children’s cognitive development through symbolic tools (signs, linguistic, and mathematical systems). Feuerstein’s mediation theory, however, modified Piaget’s theory and extended Vygotsky’s mediation theory (Lidz, 1991; Kozulin, 2004; Presseisen & Kozulin, 1992). He examined the role of the human mediator in children’s cognitive development (Feuerstein et al., 2010). Feuerstein’s mediation theory, however, has not been implemented widely in education because many educators do not know his theory (Cheng, 2011, 2012).

In the TBLT classroom, a general solution for practicing mediation to improve fluency development does not yet exist. Therefore, this study used action research to investigate the effect of mediation on learners’ fluency development in a TBLT second- or foreign-language classroom under the guidance of Feuerstein’s mediation theory. Action research is often conducted by practicing professionals to solve a problem or answer professional practice questions (Willis, 2014).

The following research question was the primary focus of this study: To what extent does mediation under the guidance of Feuerstein's Mediated Learning Experience theory improve learners' fluency in the Advanced Placement (AP) Chinese second- or foreign-language TBLT classroom?

## II. LITERATURE REVIEW

The review of literature covers the following parts: a theoretical framework for mediation and language fluency models, mediation theory implementation in second- or foreign-language classrooms, fluency studies in TBLT classrooms, and fluency measurement.

### A. Theoretical Framework

#### (a). Feuerstein's Mediated Learning Experience Theory

In Feuerstein's (Feuerstein, 1990; Feuerstein et al., 1978, 2010, 2012) mediation model, humans act as a mediator between the environment and the child to ensure that stimuli in the learning environment will be available and benefit the learners. Feuerstein (Feuerstein et al., 2010) pointed out the possibility that learners may not even be able to notice the stimuli in their learning environment because they are incapable of receiving the stimuli, cannot understand the stimuli, or because the stimuli do not appear at the right time or space for learning. The human mediator, however, "creates in a person an approach, a form of reference, a desire to understand phenomena, a need to find order in them, to understand the order that is revealed" (Feuerstein et al., 2010, p. 37). Through this mediation process, the learner will have Mediated Learning Experience (MLE). Feuerstein suggested that providing a learner MLE would ensure that the stimuli would be available and benefit the learner. Also, both the quantity and quality of the MLE affect the learning that will happen. The longer a person is experiencing MLE, the greater the possibility the learner will benefit from direct experience with stimuli (Todor, 2013). In Feuerstein's (Feuerstein, 1990; Feuerstein et al., 1978, 2010, 2012) theory, not every kind of human interaction can be considered to be mediation, and not all interactions will provide learners with a mediated learning experience. Feuerstein provides criteria (see Table 1) that describe the characteristics of interaction that he believes can create MLE. He (Feuerstein et al., 2010) identified two groups of MLE criteria: three most essential and fundamental parameters and nine conditional parameters. Each of Feuerstein's 12 parameters of MLE criteria are explained below.

#### *MLE 1: Mediation of intentionality*

Intentionality refers to a mediator's attitude that should be purposeful and directed to a specific goal the mediator wants to accomplish (Feuerstein et al., 2010, 2012). This type of mediation is employed to convey to the students that the mediator intends to help them improve (Hasson, 2018).

TABLE 1  
FEUERSTEIN'S MEDIATED LEARNING EXPERIENCE CRITERIA

Group I: Essential and Fundamental	Group II: Situational or Phase-specific
MLE 1: Mediation of intentionality MLE 2: Mediation of meaning MLE 3: Mediation of transcendence	MLE 4: Mediation of a feeling of competence MLE 5: Mediation of regulation and control of behavior MLE 6: Mediation of sharing behavior MLE 7: Mediation of individuation and psychological differentiation MLE 8: Mediation of goal-seeking, goal-setting, planning, and goal-achieving MLE 9: Mediation of the search for challenge, novelty, and complexity MLE 10: Mediation of the awareness of being a modifiable entity MLE 11: Mediation of optimistic alternative MLE 12: Mediation of a sense of belonging

#### *MLE 2: Mediation of meaning*

The mediation of meaning refers to helping learners find or understand the significance of an experience (Feuerstein et al., 2010). Conveying meaning to learners will help them understand why they need to know how to complete the task. Also, the mediator will develop learners' desire to seek meaning (Feuerstein et al., 2012).

#### *MLE 3: Mediation of transcendence*

Through the mediation of transcendence, learners will go toward the goal that goes beyond their direct and immediate needs, and connect what they are doing now to what they have done or will do at another time (Feuerstein et al., 2010, 2012).

#### *MLE 4: Mediation of a feeling of competence*

This mediation type refers to mediating learners to believe that they are competent in learning. To help learners build a sense of competence, the mediator will help learners overcome difficulties, become familiar with new content, and challenge and encourage them to reach beyond their current functioning (Feuerstein et al., 2010).

#### *MLE 5: Mediation of regulation and control of behavior*

The mediator engages learners in regulating their behavior by deciding whether they are ready to do something. This mediation includes restraining or accelerating responses (Feuerstein et al., 2010).

#### *MLE 6: Mediation of sharing behavior*

This aims to mediate learners' readiness and ability to relate with their peers, like adjusting to, learning from, or

supporting each other (Feuerstein et al., 2010).

*MLE 7: Mediation of individualization and psychological differentiation*

It helps learners create a sense of being separate individuals who think and express themselves in their own unique ways (Feuerstein et al., 2010). Mediators make sure not to impose others' aspects of experience on the learners (Feuerstein et al., 2015).

*MLE 8: Mediation of goal-seeking, goal-setting, planning, and goal-achieving*

Feuerstein (Feuerstein et al., 2010) hypothesized that the presence of a goal is the beginning of one's thinking and action. Therefore, a mediator can use mediational strategies like enlarging learners' awareness of what is possible or attainable to develop learners' ability to set goals or invest in plans to achieve goals.

*MLE 9: Mediation of the search for challenge, novelty, and complexity*

This mediation mediates learners' ability to confront challenges, adapt to the novel, and face the world's complexity (Feuerstein et al., 2010).

*MLE 10: Mediation of the awareness of being a modifiable entity*

Human beings possess a continuous identity that is modifiable (Feuerstein et al., 2010). This mediation is employed to communicate to learners that they have improved compared with the starting point (Lidz, 1991).

*MLE 11: Mediation of optimistic alternative*

An optimistic alternative will stimulate learners to realize their learning goals. Hence, a mediator mediates learners to search for an optimistic alternative or mediates the expectation for positive outcomes by encouragement (Feuerstein et al., 2010).

*MLE 12: Mediation of a sense of belonging*

A mediator can help learners develop a feeling of belonging or connection to a community. A sense of belonging will affect one's cognitive ability and psychological health (Feuerstein et al., 2010).

From the above 12 MLE categories, Todor (2013) concluded that the essence of MLE is helping to increase learners' learning motivation and cognitive abilities. The function of most types of mediation in MLE is to motivate learners in their learning. For example, mediating intentionality motivates learning by engaging learners in the stimulus. Mediating meaning inspires learning by making learners' learning experiences meaningful. Motivation is a factor that is associated with second-language learners' language fluency development (Segalowitz, 2010). Therefore, although the MLE theory is not customized for second-language acquisition, it might be used to motivate learners to improve their fluency.

Another important implication of the MLE theory is how it can work on modifying cognitive functions. By selecting, reducing, repeating, scheduling, and interpreting environmental stimuli for learners, mediators can moderate the influence of unfavorable environmental factors like cultural differences, the emotional balance of the learner, or social conditions like poverty to create cognitive prerequisites for learners (Feuerstein et al., 2010, 2015; Kinard & Kozulin, 2008). MLE also aims to change learners' "deficient cognitive functions" (Feuerstein et al., 2012, p. 2). Feuerstein et al. (2012) explained that the phrase "deficient cognitive functions" is not used to label learners' disabilities in learning but is used to cover "many very specific behaviors – for examples blurred and sweeping perception or inability to select relevant cues in defining a problem" (Feuerstein et al., 2012, p. 3). Although second- or foreign-language learners do not have actual cognitive deficiencies, functionally, it is as if they do. For example, cross-cultural differences in cognition and the second-language (L2) and first-language (L1) acquisition differences in cognitive level will affect second-language learning. Therefore, if mediation under the MLE framework can break through learners' cognitive blocks or barriers, it will help learners achieve fluency. What could be cognitive barriers in learners' L2 fluency development? This answer is in Segalowitz's second-language fluency model.

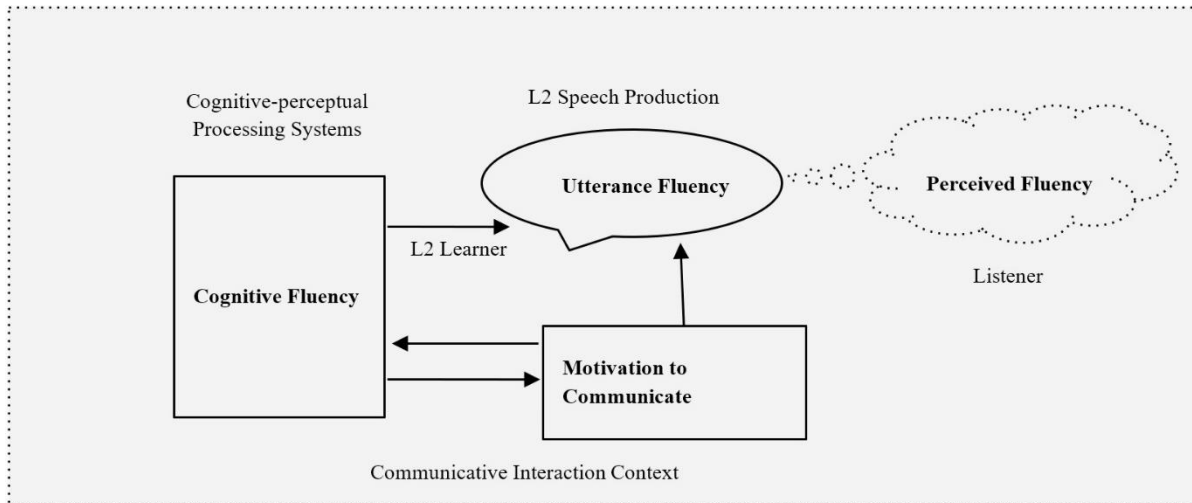
*(b). Segalowitz's Second-Language Fluency Model*

Segalowitz (2010) offered a model of second-language fluency development that interprets fluency from a cognitive science perspective and shows the possible cognitive barriers under L2 fluency development. Segalowitz's (2010) model of L2 language fluency includes three essential aspects: cognitive fluency, utterance fluency, and perceived fluency. Cognitive fluency is the cognitive process responsible for oral performance (Segalowitz, 2016). The main cognitive processes underlying oral performance include automaticity and attention to language (Segalowitz, 2010). Language automaticity means learners can perform the language quickly, efficiently, and effortlessly, and it is not limited by short-term memory capacity. Attention to language means learners can flexibly redirect the focus of attention to recruit appropriate language to form a spoken message (Segalowitz, 2010). Fluent speakers can package information smoothly into the appropriate language during speaking interactions.

Utterance fluency in Segalowitz's (2010) model describes observable oral performance by using measurable speech features like syllable rate, duration, rate of hesitations, and pauses. Utterance fluency is the quantifiable aspect of speech fluency that reflects the speaker's cognitive fluency (Nergis, 2021). Perceived fluency refers to subjective judgments of the speaker's oral fluency (Segalowitz, 2010). It is the listener's reaction to the cognitive fluency of the speaker (Nergis, 2021).

The components of Segalowitz's (2010) fluency model are represented in Figure 1. From this model, what affects utterance fluency (the measurable part of fluency) has three components: cognitive fluency, social context, and motivation. These different parts also interact with each other. Segalowitz's model shows the possibility that if MLE helps learners develop second-language-related fluency cognitive function processing and motivation, it can promote

learners' cognitive-fluency development that will be noticeable in learners' utterance-fluency performance later.



Note. This figure is an adaptation of the fluency model by Segalowitz, 2010, p. 164, Figure 7.1.

Figure 1. Segalowitz (2010) Second-Language Fluency Framework

### B. Mediation Theory Implementation in Second- or Foreign-Language Classrooms

Most studies inspired by Feuerstein's MLE theory are theory-driven (Kozulin, 2002). Very little empirical research exists on using Feuerstein's mediation theory in language classrooms. Roehr-Brackin and Tellier (2019) implemented MLE to learn if it can modify learners' language-analytic ability. Dam et al. (2020) conducted MLE with Spanish-English bilingual students to investigate if it affected their vocabulary knowledge in both Spanish and English. Mutlu and Şahin (2019) implemented MLE interactions in a seventh-grade English class in Turkey to understand the effect of MLE and what kind of cognitive activities can help develop foreign-language learners' thinking and analyzing skills.

Most mediation studies on second- or foreign-language learning mainly derive their mediation strategies from Vygotsky's mediation theory or combine Feuerstein's mediation theory with Vygotsky's. In addition, most mediation studies on speaking-proficiency development do not focus on speaking fluency development but on speaking accuracy (e.g., Ebadi & Asakereh, 2017; Poehner, 2008). Only a few studies explored fluency development, like Safdari and Fathi (2020), and Levi (2012).

### C. Fluency Studies in TBLT Learning Classrooms

Studies (e.g., Ellis, 2018; Ellis et al., 2020) have shown that many variables affect learners' fluency development in the TBLT classroom. Some researchers have tried to identify what types of tasks can foster learners' development of their language fluency (Foster & Skehan, 1996; Robinson, 2011; Skehan, 1996). Some explored the relationship between fluency development and task conditions like planning time (Foster & Skehan, 1996). Other researchers explored whether task sequencing affects language fluency (Bygate, 2001; Lynch & Maclean, 2001) or if specific instructional techniques are helpful (Van de Guchte et al., 2015). These various aspects all affect language-fluency development. In addition, they have one common aspect: they are under the implementation of the teacher. So, what is the teacher's role in a TBLT classroom? Long (2014) pointed out that the teacher's role in TBLT requires more expertise. Bygate (2015) indicated that teachers need to mediate the learners to support and accompany them during their learning process.

A few studies explored the teacher's role as a mediator in TBLT classrooms. Ellis (2009) suggested some mediation principles that teachers can follow to mediate students' learning, like tailoring tasks based on students' language proficiency level, knowing clearly what a task is, and being involved in task material development. Van den Branden (2009) observed two Dutch second-language classrooms in Flanders. He summarized that mediation in TBLT will happen when the teacher takes the role of a motivator, organizer, conversational partner and supporter, and interlocutor. Van den Branden (2016) investigated teachers' role as mediators in different TBLT stages. He pointed out that teachers are content selectors, decision-makers, learning motivators, and activity organizers in different teaching stages. Although these researchers described what teachers do or should do to mediate in TBLT classrooms, these studies are not empirical studies and did not use any mediation theory framework. Samuda (2001) investigated the teacher's role as a mediator in learners' form and meaning connection processes. Her empirical study, however, focused on language accuracy development. Currently, there is little or no research that investigates teachers as mediators mediating learners' fluency development in TBLT classrooms.

### D. Fluency Measurement

Fluency measurement has been operationalized differently by researchers and research groups because of the complexity of the concept. There are subjective and objective ways of measuring fluency. Objective measurement

methods are often used in fluency research studies (e.g., Alimorad & Yazdani, 2020; De Jong & Tillman, 2018; Li et al., 2015; Skehan & Foster, 2005; Tavakoli & Skehan, 2005). In these studies, fluency is measured by breakdown fluency, speed fluency, and sometimes also includes repair fluency. Breakdown fluency can be judged by if there are silent pauses that “break down” the speaking flow (De Jong & Bosker, 2013; Tavakoli et al., 2017). Speed fluency means speech speed and its measurement includes speech rate and articulation rate (Tavakoli & Wright, 2020). Repair fluency refers to how learners make repairs while self-monitoring their speech process (Tavakoli & Wright, 2020). Measurement of repair fluency includes the number of reformations, false starts, self-corrections, repetitions, and hesitations (Tavakoli et al., 2017).

De Jong et al. (2013) conducted a large-scale utterance fluency and cognitive fluency correlational study. The participants of their study were 208 adult L2 learners of Dutch. De Jong et al. found that some measures of utterance fluency can better predict cognitive fluency than others. They found that the number of silent pauses, number of corrections (speaker’s self-correction of speaking), and mean syllable duration (MSD, inverse articulate rate, equals to phonation time/total number of syllables) are better predictors of cognitive fluency than others. Among all these variables, mean syllable duration is the strongest predictor. The number of silent pauses measures breakdown fluency, MSD measures speed fluency, and the number of self-corrections measures repair fluency. Kahng (2020) conducted a fluency and cognitive fluency correlational study on 42 Chinese English language learners, and the study results supported De Jong et al.’s (2013) findings.

### III. METHODOLOGY

#### A. *Research Design*

An action research study was conducted to explore how to implement mediation to improve learners’ cognitive fluency in the AP Chinese second- or foreign-language TBLT classroom. The study design followed the test-intervention-test procedure. Because utterance fluency is the measurable aspect of speech fluency that reflects the speaker’s cognitive fluency (Segalowitz, 2010), this study assessed cognitive fluency development by measuring utterance fluency using a pre- and posttest. One of the researchers, who was also the teacher, conducted mediation during the intervention stage.

The action research model used is Kemmis and McTaggart’s (1988) four-moment action research model, which includes the four stages of planning, acting, observing, and reflecting. One plan-act-observe-reflect cycle is followed by another plan-act-observe-reflect cycle. The cycles continue till the end of the research.

#### B. *Setting and Participants*

This study was conducted in one AP Chinese second- or foreign-language course in an urban public high school in the San Francisco Bay Area. The class was a 4th-year Chinese class in high school, and it is equivalent to an intermediate-level college Chinese course. It was an elective course and was open to students in the whole school to enroll. As this was a year-long course, students began the course in Fall 2021 and continued on in Spring 2022.

There were a total of 25 students (72% female, 28% male; 84% Asian, 16% other than Asian) from this AP Chinese class who participated in the study. Tenth graders were 56% of the participants. Twelfth graders comprised 32% of the participants. Forty-eight percent of participants’ home language was a Chinese dialect other than Mandarin Chinese. A total of 16% of participants’ home language was Mandarin Chinese alone (4%) or Mandarin Chinese along with other languages (12%). The remaining 36% of participants’ home language was English.

The research was conducted in the class for one project unit in late January of the 2022 Spring semester. Excluding the pretest and posttest, there were 10 lessons over 16 days for the whole research period. Mediation was provided from the first lesson to the 10th lesson. All activities in the study were embedded into the course content. All students who participated completed the activities as part of their required coursework.

#### C. *The Intervention*

##### (a). *TBLT Project Unit and Task Design*

Tasks can be integrated through a project to provide coherence for developing contextualized language work in TBLT classrooms (Bygate, 2016; Nunan, 1992). In this TBLT project unit, students worked in small groups, designed a game for the Chinese New Year Game Fair, and engaged their classmates in their games. Through in-class discussion, information searching, peer interviewing, game designing, and other in-class tasks, students inquired how Chinese families celebrated the most important Chinese traditional holiday.

##### (b). *Mediation*

The teacher implemented the mediation under the guidance of Mediated Learning Experience theory and used Flavian’s (2019) mediation process model for reference. Each day’s mediation intervention was one action research plan-act-observe-reflect cycle.

###### Stage 1: Plan

The teacher collected learners’ data through the *Student Learning Background Survey* (see details in the “Instrumentation” section). Because the teacher was the mediator as well, she also self-reflected on her capability and teaching experiences to build self-awareness of her teaching. Afterwards, the teacher selected and designed tasks and

customized tasks based on teaching content requirements, mediation needs, and learners' needs.

Stage 2: Act

The teacher implemented mediation in class under the guidance of MLE.

Stage 3: Observe

During the mediation intervention, the teacher observed the students' reactions to mediation. She used an audio recorder to record her interactions with students during class time to supplement her subjective classroom observation of the class.

Stage 4: Reflect

When each mediation intervention was over, the teacher self-checked her mediation implementation. Based on her self-reflection on her teaching, she modified the mediation plan for the next day's lesson if needed.

#### D. Instrumentation

##### (a). Student Learning Background Survey

This paper survey was administered in the classroom before the beginning of the mediation cycles to gather data about students' learning backgrounds, including their age, grade, gender, family language information, and years of Chinese learning. The information gathered from the survey helped the teacher modify the lesson plans to meet the learners' needs.

##### (b). Utterance Fluency Assessment

The utterance fluency assessment was an oral presentation task that asked students to introduce the Chinese traditional holiday, the Chinese New Year, and explain its significance. The topic was adapted from the College Board 2019 AP Chinese exam cultural presentation topic (College Board, 2021). The presentation task in this study followed the AP exam speech- presentation-format guidelines. Each student was asked to record a 2-minute oral presentation in Chinese. They had 4 minutes to prepare and could write down anything they wanted on paper without using the Internet to search for information, look at their notes, or discuss with each other. After that, they started to record their 2-minute presentation. The students were seated apart to complete the speaking task using voice recorder apps on their individual cell phones. Students completed this oral presentation both prior to the start of the unit (pretest) and following the completion of the unit (posttest).

#### E. Procedures

The study design followed the test-intervention-test procedure. A pretest was given before the intervention. When students started to perform the speaking task, the teacher walked around the classroom to monitor students' task completion. The students uploaded their digital recordings to the online Google Classroom when they finished recording. The same procedure was used for the posttest.

There were 10 intervention cycles (each lesson was one cycle), and each cycle took approximately one lesson period to complete.

#### F. Data Analysis

Due to absences (five participants were absent between one and four days during the study) and corrupted data (one participant's pretest and posttest were invalid), only 21 out of the 25 participants' pretest and posttest speaking samples were used in the final data analysis.

This study measured silent pauses, number of corrections, and mean syllable duration (inverse articulate rate) in utterance fluency from collected speaking samples. Silent pauses are the silent parts that occur between runs that indicate hesitation (Park, 2016), and can be measured by calculating the total number of silent pauses during a certain period. The silent pauses that are 0.25 seconds and above are counted as an indication of fluency breakdown (De Jong & Bosker, 2013; Tavakoli et al., 2017). The number of self-corrections is the number of times a speaker self-corrects during a certain time period (Segalowitz, 2010). Mean syllable duration (MSD) is the mean of the time duration to articulate one syllable. The formula to calculate MSD is  $MSD = \text{Phonation time} / \text{Total number of syllables}$  (De Jong et al., 2013), where phonation time is the total speaking time minus silent pausing time (De Jong, 2018).

First, the researcher transcribed all collected speaking samples and marked information about self-corrections in the transcripts. Then, based on the transcripts, the researcher hand counted the number of self-corrections and the total number of syllables for each speaking sample. Each Chinese character was counted as one syllable (Lin et al., 2016; Peng et al., 2008) and not including pause fillers like "uh" or "umm" as syllables (e.g., Bygate, 2001). Second, the researcher used the voice analysis software, PRAAT (Version 6.2.12, Boersma & Weenink, 2022), to help calculate the number of silent pauses and MSD. The researcher set the PRAAT sound annotation minimum silent interval duration as 0.25 seconds, and minimum sound interval duration as 0.1 seconds. Therefore, the software could detect silent intervals (longer than 0.25s) and sound intervals and mark them as "silent" or "sounding" under the sound waves. PRAAT also marked the duration for each silent duration section and sound duration section. To double check if the software detected all the sound or silent pauses, the researcher listened to the recording while reading the marks under the sound waves and the recording transcripts. After manually correcting the errors on marks under the sound waves, the researcher hand counted the number of silent pauses for each speaking sample. Also, the researcher added all the sound duration section times based on the marks in the textgrid to get the total phonation time for each speaking sample. Then the researcher calculated the number

of silent pauses per 100 words and the mean syllable duration (MSD = total phonation time/syllables) for each speaking sample. Counting the pauses related to a speech unit ratio (100 words) but not related to a time unit was used in this study because the participants in this study self-controlled their recording devices during the pretest and posttest. Although they were given 2 minutes to do the recording for each test, it was possible that some would start or stop earlier or later than others. Finally, to determine if learners' utterance fluency improved, the researcher used paired-samples *t*-tests separately to compare the pre- and posttest values of the variables: number of silent pauses/100 words, number of corrections/100 words, and MSD.

#### IV. RESULTS

The first variable that was examined was breakdown fluency as measured by the number of silent pauses and silent pauses/100 words found in students' oral presentations on both the pretest and posttest (see Table 2). The number of syllables increased on the posttest for all but three students, with a range on the pretest of 86 to 555 and on the posttest of 161 to 518. Seven students increased their ratio of pauses per 100 words, whereas the other 14 students decreased their ratio. The ratio of pauses per 100 words ranged from 8.6 to 53.5 on the pretest and 9.5 to 37.1 on the posttest. See Table 2 for results from each student.

A paired-samples *t* test was performed to compare the number of silent pauses/100 words from pre- to posttest. There was a statistically significant difference in the number of silent pauses/100 words between pretest results ( $M = 22.97$ ,  $SD = 11.44$ ) and posttest results ( $M = 19.31$ ,  $SD = 6.88$ );  $t(20) = -2.53$ , with a medium effect size,  $d = -.55$ .

The second variable examined was repair fluency, as measured by the number of self-corrections made while speaking. The number of self-corrections and self-corrections/100 words on the pretest and posttest can be found in Table 3. Ten students had fewer corrections per 100 words on the posttest, while only one student had the same number of corrections per 100 words, and ten students had more corrections per 100 words on the posttest.

A paired-samples *t* test was performed to compare the number of self-corrections/100 words from the pre- to posttest. There was not a statistically significant difference in the number of self-corrections/100 words between pretest results ( $M = 1.12$ ,  $SD = 0.63$ ) and posttest results ( $M = 1.00$ ,  $SD = 0.63$ );  $t(20) = 0.63$ .

The final variable examined was speed fluency, measured by the mean syllable duration. The mean syllable duration (MSD) from students' pre- and posttest are provided in Table 4. Three students' MSD increased, 17 students' MSD decreased, while only one stayed the same from the pretest to posttest. The range of MSD on the pretest was 178 to 508, and on the posttest, it was 190 to 490.

A paired-samples *t* test was performed to compare the MSD from pre- and posttest results. There was a statistically significant difference in MSD between pretest results ( $M = 334.10$ ,  $SD = 88.17$ ) and posttest results ( $M = 308.52$ ,  $SD = 71.55$ );  $t(20) = -2.70$ , with a medium effect size of  $d = -0.59$ . The effect size was negative, as there was an average decrease of 25.58 MSD from the pretest to the posttest.

TABLE 2  
THE NUMBER OF SILENT PAUSES AND THE NUMBER OF SILENT PAUSES/100 WORDS IN THE PRETEST AND POSTTEST BROKEN DOWN BY STUDENTS

Student	# of silent pauses		# of syllables		# of silent pauses/100 words	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
1	51	47	166	250	30.7	18.8
2	38	44	114	161	33.3	27.3
3	41	52	160	264	25.6	19.7
4	46	59	148	220	31.1	26.8
5	40	62	86	167	46.5	37.1
6	39	43	256	277	15.2	15.5
7	47	57	227	240	20.7	23.8
8	54	53	387	428	14.0	12.4
9	48	49	555	518	8.6	9.5
10	47	55	380	377	12.4	14.6
11	37	51	194	295	19.1	17.3
12	39	43	184	310	21.2	13.9
13	49	63	177	250	27.7	25.2
14	55	46	266	311	20.7	14.8
15	18	42	173	256	10.4	16.4
16	46	66	86	235	53.5	28.1
17	22	40	110	216	20.0	18.5
18	42	38	259	317	16.2	12.0
19	59	63	244	322	24.2	19.6
20	45	49	440	441	10.2	11.1
21	51	55	242	238	21.1	23.1

\* Note: one word in Chinese = one syllable in Chinese

TABLE 3  
THE NUMBER OF CORRECTIONS IN PRETEST AND POSTTEST BROKEN DOWN BY STUDENTS

Student	# of corrections		# of syllables		# of corrections/100 words	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
1	2	0	166	250	1.2	0.0
2	2	0	114	161	1.8	0.0
3	1	4	160	264	0.6	1.5
4	3	3	148	220	2.0	1.4
5	2	2	86	167	2.3	1.2
6	4	5	256	277	1.6	1.8
7	4	3	227	240	1.8	1.3
8	2	2	387	428	0.5	0.5
9	5	6	555	518	0.9	1.2
10	6	4	380	377	1.6	1.1
11	4	3	194	295	2.1	1.0
12	0	1	184	310	0.0	0.3
13	2	1	177	250	1.1	0.4
14	1	4	266	311	0.4	1.3
15	1	2	173	256	0.6	0.8
16	1	0	86	235	1.2	0.0
17	1	1	110	216	0.9	0.5
18	1	6	259	317	0.4	1.9
19	2	6	244	322	0.8	1.9
20	4	5	440	441	0.9	1.1
21	2	4	242	238	0.8	1.7

\* Note: One word in Chinese = One syllable in Chinese

TABLE 4  
MEAN SYLLABLE DURATION (MSD) IN PRETEST AND POSTTEST BROKEN DOWN BY STUDENTS

Student	Phonation time (millisecond)		# of syllables		Mean syllable duration (MSD) (millisecond/per syllable)	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
1	68009	85386	166	250	410	342
2	57946	78865	114	161	508	490
3	55502	87675	160	264	347	332
4	48659	73760	148	220	329	335
5	39221	66943	86	167	456	401
6	88839	92790	256	277	347	335
7	90262	87704	227	240	398	365
8	83807	92248	387	428	217	216
9	98785	98271	555	518	178	190
10	92789	91591	380	377	244	243
11	96381	95213	194	295	497	323
12	59606	75477	184	310	324	243
13	57376	89078	177	250	324	356
14	83864	95029	266	311	315	306
15	48976	72235	173	256	283	282
16	30093	71484	86	235	350	304
17	41681	75420	110	216	379	349
18	86319	104491	259	317	333	330
19	64686	76104	244	322	265	236
20	90459	86070	440	441	206	195
21	74033	72923	242	238	306	306

\* Note: One word in Chinese = One Chinese Syllable

## V. DISCUSSION

Three utterance fluency variables were measured to ascertain the extent to whether mediation is an effective method for improving learners' cognitive and utterance fluency. The finding of fewer silent pauses/100 words and smaller mean syllable duration (MSD) on the posttest showed that learners, on average, produced fewer silent pauses on the posttest than on the pretest, and speakers used less time to produce a syllable on the posttest than on the pretest. The number of silent pauses and MSD are the utterance fluency variables correlating to cognitive fluency development, and MSD is the strongest predictor (De Jong et al., 2013; Kahng, 2020). The findings of this study, therefore, suggest that the mediation implemented under the guidance of the MLE theory improved learners' cognitive and utterance fluency development in the AP Chinese TBLT classroom.

The change in the number of self-corrections was not statistically significant in this study. This result, however, does not necessarily invalidate the study. Utterance fluency can be measured in different ways, including speed fluency, breakdown fluency, and repair fluency, and these different types of fluency develop at different speeds. Huensch and Tracy-Ventura (2017) conducted research on Spanish as second-language learners' utterance fluency development over two years of learning, and they found that learners' speed-fluency development appears quickest, followed by improvement in breakdown fluency. Learners in their study, however, showed no improvement in repair fluency. The different paces of the improvement of the various aspects of fluency suggest that repair fluency is a variable that may take longer to change. The mediation intervention in this study occurred during 10 lessons over 16 days, which may be too short to expect statistically significant improvement in repair fluency.

This study was conducted by one teacher-researcher, in an AP Chinese language classroom with a small number of

students. The findings may have limited applicability to other situations and contexts. While the findings of this study are promising, additional research should examine if the same mediation model works in the same way in other AP Chinese language classrooms, in other levels of Chinese classrooms, or in a language classroom that is different from a Chinese language classroom.

While the findings of this study show that mediation based on Feuerstein's mediation theory can support the fluency development of learners, many questions remain unanswered and should be addressed in future research. For example, researchers should explore the effectiveness of the 12 different types of mediation proposed by Feuerstein, i.e., is one type of mediation more effective for improving fluency than another? Researchers should also consider the effects of the length or duration of the intervention and if learners' fluency improvement is long-term in nature.

## VI. CONCLUSION

To determine if mediation of cognitive fluency under the guidance of the MLE theory is effective in a TBLT classroom, this study measured utterance fluency variables that correlate to cognitive fluency development. Three utterance fluency variables were measured in this study: (a) the number of silent pauses, (b) the number of self-corrections, and (c) mean syllable duration (MSD). The data collected from learners' pre- and posttests showed that both the learners' number of silent pauses/100 words and MSD decreased on the posttests, and the result was statistically significant, which suggests that the mediation improved learners' utterance and cognitive fluency development. Although the decrease in the number of self-corrections on the posttest was not statistically significant, it does not invalidate the research findings because self-correction is a variable that may require a much longer time to change. From the findings of this study, it can be concluded that speed fluency and breakdown fluency improve faster than repair fluency, and the mediation model built based on Feuerstein's mediation theory can effectively improve learners' speaking fluency in the AP Chinese TBLT classroom.

Today, in the language teaching field, teaching methods and technology have been overemphasized at the expense of teaching itself. Feuerstein's Mediated Learning Experience theory can help educators conceptualize the teacher's fundamental role as a mediator in the classroom. This is especially true in a constructivist learning classroom in which teachers can function as a go-between for students and the learning environment around them as well as connecting students to the stimuli in their learning environment.

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