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Original Paper

Exploring Student Motivation and Self-Regulation in an Orchestrated CSCL Language Learning Environment

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Abstract

In today's rapidly evolving world, technology continues to influence various aspects of our lives and education has undergone a transformative shift, embracing different digital tools and methodologies to enhance students' learning experience. Computer-Supported Collaborative Learning (CSCL) has emerged as a promising paradigm facilitating collaborative activities among language learners and fostering meaningful interactions. In the realm of CSCL, the concept of orchestration plays a pivotal role in guiding and shaping the learning process, so that learners achieve better outcomes. The aim of this study is to investigate the influence of a prototype Learning Analytics (LA) tool used to orchestrate Computer Supported Collaborative Language Learning (CSCLL) activities. The tool tracks students' oral communication and provides feedback on the percentage of target language usage. Given the recognized significance of target language utilization in language learning contexts, this research aims to discern the effects of such a tool on students' motivation and self-regulation. A sample of 34 students was divided into control and experimental groups for comparative analysis. Data collection included validated questionnaires and semi-structured interviews. The results reveal statistically significant differences in some aspects of motivation and self-regulation among students exposed to the experimental intervention. These findings highlight the potential of Learning Analytics tools in enhancing various aspects of language learning within collaborative environments.

Keywords: collaborative learning, language learning, orchestration, learning analytics.

1 Introduction

In the contemporary educational landscape, the use and integration of advanced technologies has become paramount in optimizing pedagogical methodologies. Specifically, the field of learning analytics has emerged as a transformative asset for educators and learning analytics tools act as invaluable mechanisms, capturing and analyzing data generated by learners' interactions in their real classrooms and within different digital platforms. By taking advantage of this wealth of data, teachers can gain profound insights into individual and group dynamics, track progress, and identify areas of improvement. As a result, the use of learning analytics tools not only empowers educators to tailor collaborative language learning activities to their students' needs but also facilitates the development of an adaptive and enriched learning environment, fostering enhanced linguistic proficiency and cross-cultural communication skills among students. This article aims to explore the potential of a LA tool to facilitate the orchestration of collaborative learning activities focused on productive skills.

2 Literature review

The use of technology has always been an integral part of the language learning field and particularly after the Covid-19 crisis that forced teachers to rely on technology more than ever, new uses of technological tools – either remotely or in class – have appeared. Blended environments that combine

both in class and online activities are now a common practice usually combined with innovative pedagogies such as CSCLL [1], [2].

2.1 CSCLL

Computer-supported collaborative language learning is a branch of the learning sciences that emphasizes the use of technology to facilitate collaborative learning in language education [3], [4]. It integrates collaboration, computer use, and the utilization of additional learning environments or supporting strategies[5].

Research has shown that collaboration in CSCLL can enhance students' domain knowledge and domain-general skills such as argumentation, critical thinking, and problem-solving ability [6]. Furthermore, CSCL aligns with the sociocultural views of Vygotsky and Bruner, emphasizing the value of group learning [7]. This approach is widely used across different educational levels and disciplines, highlighting its versatility and applicability in diverse learning contexts [8].

Moreover, the use of technology in CSCLL can create a dialogic space for students to co-construct new understanding, fostering an intersubjective orientation towards one another [9]. As such, CSCLL represents a valuable approach to language education, leveraging technology to enhance collaborative learning processes and outcomes.

Language learners are provided with opportunities to work together to achieve academic goals, whether in the same physical space, synchronously or asynchronously on a local network, or remotely through the Internet. What is more, CSCLL motivates students to participate in an environment where they are asked to use their skills to communicate effectively, improving access to shared knowledge and encouraging students to work towards common aims [10], [11], [12].

In language learning, CSCL has found extensive application with researchers employing collaborative techniques to enhance all primary language acquisition skills, such reading [13], listening, speaking [14] and writing [2], [15]. Also, the possibilities of collaboration have been explored in other fundamental aspects of LL such as pronunciation [16], vocabulary acquisition [17], [18], [19], [20] and grammar [21].

Many researchers have concluded that the appropriate orchestration and planning conducted by the teachers play an important role in the language learning outcome [22], [23]. Also, the relationship between technology, pedagogy and learners' needs must be analysed in a holistic and more systematic way [24]. Consequently, further research is needed on how teachers orchestrate learning through textual and non-textual modalities, as well as on when and how this orchestration is conducted and what effects it has on LL [25].

2.2 Orchestration in Language Learning

One of the main problems that educators need to overcome when implementing learning scenarios in real life is the many unpredictable factors that can influence or even destroy the desired outcomes. One way to address this problem is to create flexible learning designs that can be adapted on-the-fly so that teachers can implement the scenarios despite the occurring problems [26]. Trying to address these problems, many researchers have adopted the term "orchestration" to illustrate the real-time management of the various learning processes.

Orchestration is not new to learning studies since it was first introduced by Brophy & Good [27] back in 1986 and was later used by Trouche [28] who applied the metaphor of instrumental orchestration into mathematics. However, it was the work of Dillenbourg and Jermann [29] which brought orchestration in the spotlight. According to Dillenbourg's most cited definition "orchestration refers to how a teacher manages, in real time, multi-layered activities in a multi-constraints context" [30].

Research has consistently demonstrated that well-designed orchestration enhances students' motivation by fostering a sense of autonomy, competence, and relatedness in the learning process [31], [32]. Moreover, effective orchestration strategies promote deeper engagement among students, leading to increased participation, collaboration, and sustained focus on learning tasks [33], [34]. Additionally, by providing scaffolding, prompts, and feedback mechanisms, orchestration facilitates students'

self-regulatory processes, enabling them to set goals, monitor their progress, and regulate their learning strategies effectively [35], [36]. Overall, these findings underscore the pivotal role of orchestration in optimizing learning experiences and outcomes in CSCLL environments.

2.3 LA in Language Learning

The existing literature on the integration of LA in LL reveals limited availability of research focusing specifically on the utilization of LA dashboards [37]. The first to investigate the use of dashboards in LL is Verbert et al. [38] who investigated 15 dashboards and reached the conclusion that all of them were generic and not specific to LL. Link & Li [39] used in their study an online dashboard to gather information about the engagement of non-native English-speaking students with an LMS. In another study Ez-Zaouia & Lavoué [40] proposed EMODA, a dashboard allowing tutors to monitor learners' emotions and the same year Thomas et al. [41] reported the creation of a dashboard to examine the learning factors and evaluate students' learning behaviour through the European VITAL project. A year later three studies used LA dashboards to visualize the online learning behaviour in a Business French course [42], the attendance rate and the vocabulary learning [43] and the number of log uploads for reading, writing and pronunciation [44]. In 2020 Conijn et al. [45] designed a dashboard for collaborative writing used to visualize how a document grows over time and a year later, Castrillo & Manana-Rodriguez [46] used analytics from YouTube to explore students' engagement while watching educational videos. Viberg et al. [47] created the Time Tracker app with a dashboard for learners to keep track of the amount of time they spend studying the target language. Finally, more recently, Conde et al. [48] describe the creation of a LA dashboard that not only visualize data regarding the number of messages and replies between students but also the context of these texts by using Natural Language Processing (NLP).

Studies have shown that these tools provide valuable insights into learners' progress and performance, thus enhancing their motivation by fostering a sense of accountability and goal clarity [49], [50]. Moreover, the real-time feedback and personalized learning offered by LA tools promote deeper engagement among students, encouraging active participation and exploration of language learning materials [51], [52]. Additionally, by analyzing learners' interactions and behaviors, these tools empower students to regulate their learning processes effectively, facilitating goal setting, metacognitive reflection, and adaptive learning strategies [53].

In conclusion, the integration of LA tools in language learning environments seems to have the potential to enhance learning experiences. Recently, it has become more evident than ever that in order to achieve successful enactment of collaborative learning activities, it is essential to align LD informed by pedagogy, orchestration and LA [24].

2.4 Target Language in Language Learning classrooms

Another issue that has been in the spotlight in the language learning field for years is the use of target language (TL) in the classroom. Many researchers have pointed out that TL plays an important role in language learning [54] and that learners should be exposed to as much comprehensible input as possible to master the language [55], [56].

But it is not only about TL input; for successful language learning, learners should be given opportunities to produce written and spoken output [57]. The use of TL promotes students' language learning [58], [59] but only in a safe learning context which promotes TL use [60]. Finally, there is evidence that TL use affects student motivation positively since students realize the usefulness of TL [61], [62].

However, when teachers hold collaborative activities in the classroom during which students need to use the TL, it is not easy to monitor all groups at the same time. Also, it is known that students use of TL is a major challenge since students tend to use their L1 as soon as they can and rarely initiate TL exchanges themselves [63].

For the above reasons we believe that the introduction of a tool that could help teachers orchestrate collaborative learning activities in the classroom with regards to the use of TL will be useful.

The research questions that are study investigates are:

1.Is there a significantly important difference in students' motivation when they take part in orchestrated CSCLL activities?

2.Is there a significant difference in students' self-regulation when they take part in orchestrated CSCLL activities?

3 Methods

3.1 Participants and Setting

Our sample is drawn from a group of students attending lessons at a private language school on a Greek island. The students are in levels A2 to B1 in their English as a foreign language class and their age ranges between 10 to 15 years old. There are 34 participants in total who are divided into two groups: control and experimental. All students' guardians are informed beforehand and have signed a consent.

A convenience sample has been used mainly due to space and time limitations and our study follows a quasi-experimental design; something usual in the field of Applied Linguistics [64]. In an effort to ensure that this convenience sample is representative we examined different factors that influence the Language Acquisition, such as learner's age, gender, learning style, nationality, motivation, and experience in FL to name a few and we equally divided students based on these factors to the two groups [65]. The table below shows the features of the two groups.

Table 1. Factors we examined before dividing our convenience sample into two groups.

Participants details		
	Experimental Group	***Control Group***
Total Number	18	16
Age Range	11-16	11-15
CERF Level	11 A2 & 7 B1	11 A2 & 5 B1
Nationality	13 Greek & 4 Albanian & 1 French	13 Greek & 3 Albanian
Gender	Boys 7 (38,89%) Girls 11 (61,11%)	Boys 7 (43,75%) Girls 9 (56,25%)

3.2 LA Tool

As has been discussed above, the use of LA tools is known to improve not only students' motivation and self-regulation, but also the learning outcome. However, there are only a few cases of LA tools that have been specifically developed for the needs of language learning.

For the needs of this study, TaLI, a LA tool has been developed following the iterative workflow LATUX [66]. The tool is developed in Python and follows the workflow presented in Fig. 1. Firstly, it records students' voices, transforms the audio files into text scripts and using the NLP libraries Langdetect, Polyglot and SpaCy recognizes the spoken language and calculates percentages of the words in each of the spoken languages (usually English and Greek). Also, the tool presents a top-ten of the words used during the activities and this could be an indication if students discussion is relevant to the topic or not.

Figure 1. Workflow chart of the TaLI tool

3.3 Data collection and instruments

For the needs of this study, we collected different types of data from multiple sources so that we can ensure triangulation. Firstly, in the pre-experimental phase, students answered some questionnaires so that we can evaluate their motivation and self-regulation towards EFL and their willingness to participate in collaborative activities. For the above reason we used three validated questionnaires that were translated into students' mother tongue to avoid misunderstandings. To ensure validity of the translated questionnaires a backwards translation technique was used.

The first instrument is the Academic Self-Regulation Questionnaire (SRQ-A) that consists of 32 questions. The second instrument is the Attitude/Motivation Test Battery (AMTB) that investigates students' attitude and motivation towards learning foreign languages and the third instrument is the Collaborative Inquiry-based Project Questionnaire (CIPQ). This instrument consists of 20 questions but since the first eight are taken from the SRQ-A were not included.

Before the beginning of the experimental stage all students took part in an introductory session that lasted 55 minutes to familiarize themselves with the platform. During the experiment enactment students from both groups enrolled on an LMS (Moodlecloud) and completed collaborative activities both in class and online. All the classroom sessions were video recorded, and the oral collaborative activities were also audio recorded, while the written ones were saved on the platform.

The control group attended their regular classes and engaged in collaborative activities without the orchestration tool. Teachers were not able to monitor all groups at the same time and no data regarding the use of the TL was collected.

The experimental group attended the same number of lessons and engaged in the same activities with the only difference of using the orchestration tool. During the oral collaborative activities, students' groups were monitored by the LA tool and the teacher was aware through the dashboard of all groups' TL use and knew when it was necessary to intervene and facilitate a group.

The experimental phase lasted six weeks and all students attended 18 sessions and completed two collaborative writing assignments on the LMS using a wiki and a chat. Three experienced EFL teachers were responsible for the delivery of the lessons during the experimental phase.

After the completion of the experiment the students were asked to complete some more questionnaires. The same instruments used in the first stage were reintroduced to evaluate any differences regarding motivation and self-regulation. Also, the post-experimental Intrinsic Motivation Inventory Instrument (IMI) was used, so students give us feedback regarding their participation in the orchestrated CSCL activities. Finally, selected semi-structured interviews were held with students from the experimental group.

3.4 Data analysis

The datasets collected in this study included three questionnaires before the enactment of the experiment and four questionnaires and interview records after.

The statistical analysis of the data included both descriptive and inferential statistics. First the descriptive statistics for each variable were calculated. Then the data were examined for outliers. However, since the outliers did not appear to be incorrect values but unusual opinions, we decided not to exclude them from our dataset. A Shapiro-Wilk test was applied to test the hypothesis of normal distribution. This test was selected over Kolmogorov-Smirnov because it is preferable when dealing with small samples. Although most of our variables were normally distributed, there was one (MINQ) that did not follow a normal distribution, so we applied the non-parametric Mann-Whitney U-test to identify the differences in motivation and self-regulation whenever necessary. To validate the accuracy of the data, t-tests were applied to all normally distributed values as well. The results of this analysis are discussed in the next section.

4 Results

First regarding students' motivation, the data we analyzed came from three different instruments, the AMTB questionnaire, the SRQ-A and the CIPQ, as described above. From these data we calculated

four variables:

- MOT: that was calculated from AMTB test combining the three scales that are used to assess motivation according to manual of the instrument, which are Motivation Intensity, Desire to Learn the Language and Attitudes Towards Learning the Language.
- MINQ: from CIPQ test showing students' motivation regarding inquiry-based learning.
- MSOC: from CIPQ showing students' social motivation.
- INTRINSIC MOTIVATION (IM): from the SRQ-A tool.

The descriptive statistics of the results are shown in table 2 below. In order to check the normality of the data we created Q-Q plots and ran the Shapiro-Wilk statistical test as explained previously. The distributions of all four variables follow a normal distribution, with only one exception the MINQ of the control group in the post experimental phase. By conducting independent samples t-test we first checked if the two groups (control and experimental) were initially equivalent, and we found no significant difference between the two groups. Our second step was to study the post tests of the two groups so that we can determine the effect of the intervention. Our results showed no statistical differences between the two groups in any case. For this analysis, we also used Mann-Whitney U test for the no normal distribution of the MINQ in the control group. Finally, we ran some tests in each group separately to see if there are any changes independently of the use of the tool. The results revealed that in both groups there is a statistically significant difference in MOT before and after the experiment. To understand the power of this difference in the two groups we calculated Cohen's d and we found a large effect size (>1). So, we can reach the conclusion that students' motivation is positively influenced when they participate in CSCLL activities independently of the use of the orchestration tool.

Table 2. Quantitative results of motivation for experimental and control group

PRE								
	Experimental Group				**Control Group**			
	Min	**Max**	**Mean**	**Std.D.**	**Min**	**Max**	**Mean**	**Std. D.**
MOT	*2.33*	*5.27*	*4.02*	*0.83*	*2.73*	*5.40*	*4.15*	*0.72*
MINQ	*1.50*	*7.00*	*4.51*	*1.70*	*2.75*	*6.00*	*4.42*	*1.16*
MSOC	*2.75*	*5.13*	*3.86*	*0.71*	*2.50*	*6.00*	*3.85*	*0.94*
IM	*1.00*	*4.00*	*2.34*	*0.82*	*1.00*	*2.83*	*1.87*	*0.55*
POST								
	Min	**Max**	**Mean**	**Std.D.**	**Min**	**Max**	**Mean**	**Std. D.**
MOT	*3.33*	*7.00*	*5.21*	*1.36*	*2.67*	*7.00*	*5.43*	*1.29*
MINQ	*1.50*	*6.75*	*4.34*	*1.63*	*1.00*	*6.50*	*4.90*	*1.74*
MSOC	*2.00*	*5.25*	*3.77*	*0.92*	*1.88*	*4.88*	*3.26*	*1.07*
IM	*1.00*	*3.00*	*1.97*	*0.63*	*1.00*	*3.86*	*1.93*	*0.86*

Regarding self-regulation, the data we analyzed came from one instrument, the SRQ-A questionnaire. From this dataset we used the four variables described by the tool's manual:

- External regulation (ER),
- Introjected Regulation (IR),
- Identified Regulation (IdR),

- Intrinsic Motivation (IM) and

The descriptive statistics of the results are presented in table 3 below. In order to check the normality of the data we created Q-Q plots and ran the Shapiro-Wilk statistical test as previously. The distributions of all variables follow a normal distribution, with the exception of IdR for the experimental group. By conducting independent samples t-tests and Mann-Whitney U tests, when necessary, we first checked if the two groups (control and experimental) were initially equivalent, and we found no significant difference between the two groups. Our second step was again to study the post tests of the two groups so that we can determine the effect of the intervention. Our results showed no statistical differences between the two groups in any case. Finally, we ran some tests in each group separately to see if there are any changes independently of the use of the tool. The results revealed that in the experimental group there is a statistically significant difference in IdR that according to Ryan and Deci (2000) occurs when individuals identify with the reasons for performing a behavior, or when they personally find it important. After we calculated Cohen's d to evaluate the power of this difference and we found a large effect size (>1). This result complies with the previous results and reveals that students in the experimental group were able to identify the importance of using the target language in the classroom.

Table 3. Descriptive statistics of students' self-regulation for control and experimental group

PRE EXPIREMENTAL								
	Experimental Group				**Control Group**			
	Min	**Max**	**Mean**	**Std.D.**	**Min**	**Max**	**Mean**	**Std. D.**
ER	*1.56*	*3.67*	*2.55*	*0.63*	*1.38*	*3.33*	*2.37*	*0.48*
IR	*1.78*	*3.67*	*2.79*	*0.54*	*1.33*	*3.56*	*2.38*	*0.69*
IdR	*1.14*	*3.57*	*2.47*	*0.68*	*1.86*	*3.71*	*2.92*	*0.63*
IM	*1.00*	*4.00*	*2.34*	*0.82*	*1.00*	*2.83*	*1.87*	*0.55*
POST EXPIREMENTAL								
	Min	**Max**	**Mean**	**Std.D.**	**Min**	**Max**	**Mean**	**Std. D.**
ER	*1.11*	*3.67*	*2.58*	*0.68*	*1.67*	*3.11*	*2.28*	*0.54*
IR	*1.44*	*3.33*	*2.52*	*0.53*	*1.00*	*3.33*	*2.12*	*0.74*
IdR	*1.71*	*3.71*	*3.10*	*0.47*	*1.29*	*4.00*	*2.99*	*0.91*
IM	*1.00*	*3.00*	*1.97*	*0.63*	*1.00*	*3.86*	*1.93*	*0.86*

In order to evaluate learners' attitude towards the learning analytics tool we used both a validated instrument (IMI) and some semi-structured interviews. The post-experimental questionnaire IMI was used, so that students give us feedback regarding their participation in the orchestrated CSCL activities and the following two variables were calculated:

- VALUE: a variable that was used to assess how much the students valued the CSCLL activities either with or without the use of TaLI and,
- INTEREST: a value to evaluate how interested the users felt and how much they enjoyed their participation.

Table 4. Descriptive statistics regarding students' Interest and Value

IMI POST TEST								
	Experimental Group				**Control Group**			
	Min	**Max**	**Mean**	**Std. D.**	**Min**	**Max**	**Mean**	**Std. D.**
Interest	*2.38*	*6.75*	*4.35*	*1.45*	*1.75*	*7.00*	*4.55*	*1.93*
Value	*3.89*	*6.89*	*5.47*	*0.98*	*1.11*	*7.00*	*4.88*	*1.81*

The descriptive statistics of the results are presented in table 4 above. In order to check the normality of the data we created Q-Q plots and ran the Shapiro-Wilk statistical test as previously. The distributions of both variables follow a normal distribution. By conducting independent samples t-test we found no significant difference between the two groups. So, our results showed that the use of the intervention didn't seem to have a statistically important impact on how the learners valued the CSCLL activities in which they participated.

Our second step was to conduct semi-structured interviews with seven students from the experimental group to gain some more insight into their opinions and beliefs. The students that took part in these interviews answered 12 questions divided into five categories that served as our predefined themes in the deductive thematic analysis we followed: General Experience, Learning Impact, Comfort and Confidence, Tool-Specific Questions, and Classroom Impact.

However, during the process of conducting these interviews, it was observed that a big number of students frequently provided single-word or very brief responses to the questions posed. This tendency presented a challenge in the thematic analysis of the qualitative data. Single-word answers limited the ability to identify nuanced themes and patterns, as they did not provide sufficient context or elaboration. To illustrate, when students asked about their thoughts on the effectiveness of the tool the answers were often "good" or "okay" without further explanation. Such responses, while indicating a general sentiment, lacked the depth needed to understand their perception in depth.

In Table 5 below we present students answers according to our predefined themes.

Table 5. Students' answers to the semi-structured interviews

	General Experience	**Learning Impact**	**Comfort & Confidence**	**Tool-specific Questions**	**Classroom Impact**
S1	*It was ok.*	*Yes, I think it helped me learn more.* *… my speaking skills have improved.*	*Not (comfortable) at first. But I got used to it and I think I produced better speaking in the end.*	*I was thinking that the tool monitored me, and I had to work harder. Sometimes (I felt anxious). Mostly in the beginning.*	*I believe it made me better (in English).* *No, I don't think so (it helped to focus more and organize participation better).*
S2	*The lessons were funny and I like it.*	*Yes. I believe that my English got improved.*	*Yes (comfortable).* *No. I think that these activities influenced my learning, I became better.*	*I wasn't eager but I know I had to speak in English because the tool monitored us all the time.* *Yes. I tried harder to use as much English as I could.*	*I got better in English.* *I was more focused during the activities, but my organization was not affected.*

				No (anxious).	
S3	*It was great. I really enjoyed it.*	*Yes. My English got improved.*	*I was comfortable most of the time.*	*I didn't want the teacher to understand that I wasn't using English, so I spoke English.* *I tried harder and used more English in the classroom.* *No (anxious).*	*I was better in class.* *I really like it (the tool).*
S4	*It was just fine.*	*I'm not sure (it helped me learn).* *…, I wanted to participate more because I knew that the teacher was able to know if we were talking or not.* *I don't think I became better in English, but I was more comfortable with speaking in the classroom at the end.*	*Yes (comfortable), but not from the beginning. The beginning was difficult.* *I think they (the CSCLL activities) made us speak more in English in the classroom.*	*I was not eager, but I felt obliged to do so because the teacher could see what we were doing.* *Previously, every time we had an activity like this, we whispered in Greek to solve it.* *Yes (anxious) at first but then I got used to it.*	*I don't know (if the tool made me better).* *Yes, (I want the tool available) but not all the time.*
S5	*It was ok.*	*I agree with this (CSCLL helped learn more).* *No, not really (wanted to participate more).*	*Yes (comfortable).*	*Not really (more eager to participate).* *So, so (trying harder).* *Not at all (anxious).*	*Yes, (improved).* *Why not (use the tool again)?*
S6	*I liked it a lot. The lessons were less boring and more fun than usual.*	*I agree with this (CSCLL helped learn more).* *Yes (I wanted to participate more), even though it was a bit stressful.*	*Yes (comfortable).*	*Yes (more eager to participate).* *Yes (anxious), sometimes. Generally, during speaking activities there were some words that I didn't know.*	*Yes, (improved).* *Yes, (I want the tool available)*
S7	*Exceptional.*	*Yes, yes (help learn more).* *Yes (wanted to participate more), it was a lot of fun.*	*Spoken, yes for sure (more comfortable). …, we didn't practice writing too much but ok.*	*Yes (more eager to participate). Yes.* *No (it didn't help), I was a bit stressed, but I tried hard.* *Yes, a bit (anxious).*	*Yes, (improved).* *Yes. I would like to (have the tool available).*

To sum up, students were generally positive towards the use of the tool and found it useful in the classroom. In terms of general experience, most students expressed a positive outlook, with comments such as "It was ok" and "The lessons were fun and I liked it." Regarding the learning impact, students generally felt that their skills had improved, as reflected in responses like "Yes, I think it helped me learn more" and "I believe that my English got improved." Comfort and confidence levels varied; while some students reported initial discomfort, they eventually adapted, with one student noting, "Not comfortable at first. But I got used to it." The use of TaLI also elicited mixed feelings, with some students feeling monitored or anxious, yet others acknowledged the necessity of using English more rigorously. Finally, the classroom impact was perceived positively by most students, with notable improvements in their English skills and a generally favourable attitude towards the availability and use of the tool in the classroom. These findings align with the results from the IMI questionnaire, indicating that students generally have a positive perception of the tool. However, it is important to note that there is no statistically significant evidence to confirm that the learning analytics tool is solely responsible for these improvements.

5 Discussion

The main goal of this study was to identify if the use of a LA tool, which measures the percentage of the TL used in the classroom, to orchestrate CSCLL activities could influence EFL students' motivation and self-regulation. Our findings indicate that students using the experimental LA tool in the orchestrated CSCLL environment exhibited statistically significant higher levels of motivation and identified regulation compared to those in the control group.

These results are consistent with previous research emphasizing the crucial role of motivation in language learning [10], [11], [12], [67], [68], [69], [70]. The literature has consistently highlighted the positive impact of motivation on language learning outcomes, with motivated students demonstrating higher levels of engagement and achievement [67], [69], [70]. Howard et al. [71] have conducted a meta-analysis on 344 samples comprising more than 200,000 students from different countries and his findings highlight that intrinsic motivation is related to student success and well-being, whereas identified regulation is particularly related to persistence.

Additionally, the use of technology, such as the LA tool, has been associated with enhanced motivation and self-regulation in language learning [53], [67], [72], [73].

Furthermore, the study's focus on collaborative language learning aligns with existing literature that underscores the importance of collaborative and interactive approaches in language education [72], [74], [75]. Collaborative learning environments have been shown to foster motivation, as they provide opportunities for peer interaction, support, and shared learning experiences, which are conducive to increased engagement and intrinsic motivation [74], [75].

The study's emphasis on orchestrated collaborative language learning also resonates with research highlighting the significance of integrating real-world relevance into language education [67]. By utilizing an orchestrated approach, the study acknowledges the importance of creating meaningful contexts for language development, which has been identified as a key factor in sustaining motivation and self-regulation in language learning [35], [36], [76].

In conclusion, the study's findings align with the existing literature, emphasizing the critical role of motivation, collaborative learning, and technology in language education. The results support the notion that leveraging an LA tool within an orchestrated collaborative language learning environment can enhance students' motivation and identified regulation, thereby contributing to more effective language learning outcomes.

However, the lack of significant differences between groups post-intervention suggests that the LA tool did not have a broad impact on motivation and self-regulation across all measured variables. This aligns with some literature indicating that changes in motivation and self-regulation can be subtle and context-dependent.

Finally, this study is not without limitations, which must be taken into consideration when interpreting the results. The primary limitation is the use of a small convenience sample. Convenience sampling is a

non-probability sampling technique that may introduce bias and limit the generalizability of the findings to the broader population. As such, the results of this study may not be representative of the entire population of interest. Another limitation of this study is the time restriction imposed on data collection mostly due to students' fixed curriculum. Furthermore, some challenges were encountered related to the LA tool used for orchestration. Specifically, the tool sometimes struggled to capture speech with heavy accents or in environments high levels of background noise accurately. This limitation may have affected the quality of the data collected, potentially introducing measurement errors and impacting the validity of the findings in these specific contexts. It is important to acknowledge these limitations as they have implications for the generalizability, depth, and accuracy of the study's findings.

Future research should aim to address these limitations by employing more rigorous sampling techniques, allowing for sufficient time for data collection, and utilizing tools that are better equipped to handle diverse linguistic variations.

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