The impact of virtual reality (VR) pedagogy on L2 English learners’ oral communication and pragmatic competence

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Abstract

Virtual reality (VR) has been recognized as a promising technological advancement in computer-assisted language learning, particularly in foreign language environments, as it can enable second language (L2) learners to meaningfully engage with the target language. However, research is needed that investigates VR’s influence on L2 learning beyond the accuracy and fluency of speech production, including aspects such as pragmatics. Thus, this study explores the effectiveness of a VR tool on the development of L2 English learners’ oral pragmatic abilities. A quasi-experimental, mixed methods design was adopted with university students in Turkey who participated in a control (n = 30) or experimental group (n = 30). For six weeks, the experimental group completed various VR-related tasks using the platform ImmerseMe, while the control group completed regular classroom activities. Data included a pretest-posttest involving oral discourse completion tests, along with semi-structured interviews to examine students’ perceptions of VR. The results revealed that while the VR group made greater gains on average, these differences between groups were not statistically different. Follow-up interviews revealed that students generally enjoyed using VR tasks and felt they were effective, but they also faced challenges. Implications are discussed for future L2 research and teaching with VR.

Keywords: Foreign language learning, Oral Communication Skills, Pragmatic Competence, Virtual Reality (VR)

Language(s) Learned in This Study: English


Introduction

Over the past two decades, technological innovations have led to many new changes in approaches to second language (L2) pedagogy. For example, virtual spaces, such as online chatrooms, forums, digital games, and social media, have become increasingly prevalent and are being adopted by L2 learners and their teachers both inside and beyond the classroom (e.g., Barrot, 2022; Chik, 2014; Kessler, 2023; Loewen et al., 2022). Of these innovations, virtual reality (VR) technologies have received a considerable amount of attention from researchers who are interested in computer-assisted language learning (CALL). This is because VR is capable of providing an immersive experience where learners can situate themselves in a (semi)-realistic context and engage with the target language (TL) in interactive and meaningful ways (Lan, 2015, 2020; Lin & Lan, 2015; Taguchi, 2022). Yet, despite this surge of interest in VR’s capabilities for L2 learning, Sykes and González-Lloret (2020) have noted that studies are lacking that examine VR’s implementation in the classroom, and particularly, VR’s effectiveness for pragmatics instruction.

In this study, we respond to this call with a classroom-based investigation that explores the extent to which the VR tool ImmerseMe offers affordances for first-year L2 English learners in Turkey. Specifically, this
study examines the extent to which VR pedagogy can be integrated into foreign language (FL) instruction as a means of developing learners’ pragmatic abilities in situated interactions. In what follows, we discuss existing research involving L2 pragmatics and CALL. Then, we describe the context of the study, including how VR was integrated and assessed in terms of its utility. Finally, after reporting the findings, we close with a brief discussion of VR’s potential for FL classrooms.

**Literature Review**

**CALL Research on Pragmatics and VR**

The study of technology-mediated second and FL pragmatics, also known as interlanguage pragmatics, is one of many subfields that has attracted the attention of CALL researchers in recent years. This is due to various reasons. For one, as Sykes and González-Lloret (2020) have remarked, proficiency in an FL (in terms of grammatical accuracy and fluency) does not necessarily imply that one can proficiently demonstrate pragmatic appropriateness, etiquette, or adherence to other culturally specific norms. Secondly, it has been suggested that CALL technologies have the capacity to assist in the development of pragmatic competence, particularly for FL learners. That is, since FL learners typically have limited access to the TL input, CALL technologies have been seen as a means of solving this problem, thereby providing increased access to L1 speakers, the TL, and opportunities for interaction (González-Lloret, 2019). When it comes to CALL and pragmatics, researchers have investigated a myriad of technologies, tools, and software, and their respective capacities to promote pragmatic competence. For instance, prior studies have examined the effects of interactive videos on formulaic expressions (e.g., Taguchi et al., 2017) and the impact of digital games on learner apologies (e.g., Sykes, 2013). In sum, these studies suggest that if implemented properly, explicit pragmatic instruction can result in positive L2 learning outcomes.

More recently, there has been increasing interest in the use of VR technologies for CALL (see Chen et al., 2022; Dhimolea et al., 2022). As Xie (2010) describes, VR technologies are computer-generated simulations, which are meant to replace the real world with a modified replica, thereby providing users with a sense of being there (e.g., in a physical building or outdoors), in addition to potentially being able to interact with people or objects; however, this depends on the type of VR platform itself, as some platforms afford users opportunities to engage in structured interactions, while others only allow limited activities such as viewing a virtual space. Expanding on Xie’s description, we define VR here as a virtual context that allows learners to be immersed in a (digital) TL culture without the necessity of travel. Relatedly, it is important to point out that two different subtypes of VR are recognized, which include high-immersion and low-immersion VR. A high-immersion experience involves the use of a VR headset, while low-immersion typically involves the use of a computer monitor/laptop, mouse, and keyboard to navigate the virtual environment (Dhimolea et al., 2022). As the names imply, each type offers users different levels of digital immersion.

Importantly, a growing number of studies have suggested that VR can be useful for L2 learning purposes. In Thrasher (2022), 25 L2 French learners completed tasks using the social VR application vTime XR with Oculus Go VR headsets. Thrasher found that when using the VR application, students exhibited less anxiety and greater oral comprehensibility. Similarly, in a study by Xie et al. (2019), the researchers investigated the influence of the VR tools Google Cardboard and Expeditions on 12 L2 Chinese learners’ oral proficiency. Their findings also appeared to show increased oral proficiency when students used the VR applications, with the learners reporting that they believed VR encouraged more interactive learning.

Most pertinent to the current study, some (albeit limited) research has explored VR’s use for teaching L2 pragmatics. In a synthesis piece, Bahari (2021) examined 75 VR studies published from 2010–2020. While Bahari noted that studies on pragmatics and sociopragmatic learning were noticeably absent, one recent exception in this area is Taguchi (2022). Taguchi’s study compared the speech act performance of 62 L1 and L2 English speakers as they completed two role-play tasks using a computer or VR headset. Taguchi examined the influence of the medium itself (i.e., computer vs. headset) on the oral fluency and speech act
strategies of participants when making requests, refusals, and giving opinions. Taguchi found that both groups of participants tended to speak more slowly and use a greater number of modification devices when using the VR headset. This led Taguchi to theorize that VR may have potential benefits, particularly for prompting modification strategies. However, it may also have the capacity to increase the cognitive load that is placed on learners, thereby leading to less fluent oral speech.

While Taguchi’s (2022) study is a notable exception that addresses the topic of VR and pragmatics, Taguchi herself remarked that one of the limitations of her study was that she did not assess her participants’ beliefs about VR (e.g., its effectiveness or their comfort), which might have influenced their performance and learning. In addition, as is evident, more studies are needed that investigate VR’s capacity to develop oral communication skills involving pragmatics.

The Current Study

The current classroom-based study responds to researchers’ calls to investigate the extent to which VR can influence L2 learners’ pragmatic abilities in oral interactions and to further explore students’ beliefs about the integration of VR into their courses. This study was guided by the following research questions (RQs):

- RQ1: To what extent does a VR-enhanced class (using ImmerseMe) differ from a control group in terms of their development of L2 pragmatic abilities?
- RQ2: What are students’ perceptions of using the VR technology ImmerseMe in the L2 English classroom?

Methods

Context

This study was conducted at a Turkish university. Since the medium of instruction is in English, all students enrolled in the university were required to prove English language proficiency with an equivalent TOEFL score of 80, in addition to completing other exam requirements during their undergraduate studies. To prepare students for such exams, during the first year of their studies, students take English courses with a curriculum that includes both academic and communication skills. In this regard, a quasi-experimental design was used in this study, with students who were enrolled in two different sections of the first author’s English course (called Oral Communication II, which adopted a flipped learning model). All students in the course were English majors, and they reported no prior experiences with VR technologies. For this particular course, based on standardized placement exams (e.g., TOEFL), all students were considered to be advanced-level speakers on the ACTFL scale.

Prior to enrolling, students were informed of the research aims and given the opportunity to have their data included or excluded. In total, 60 students agreed to participate, with 30 students from each section. The students ranged in age from 18 to 22 ($M = 19.5$, $SD = 0.4$). Most participants were female ($n = 40$), but both groups were relatively balanced in terms of ages and genders. They were also balanced in terms of their English oral communication abilities (described later).

VR Platform: ImmerseMe

ImmerseMe (https://immerseme.co/) is an educational VR platform that was created in 2015 with an emphasis on language learning and skills development. It provides real-life environments where users are immersed in interactive simulations with pre-recorded L1 speakers while completing daily tasks (e.g., ordering from a coffee shop). Focusing on L2 pedagogy, these tasks consist of translation, dictation, reading, speaking, and immersion in languages such as English, French, German, Greek, Indonesian, Italian, and Spanish at different proficiency levels (see Berti, 2020 for more details). For the present study, ImmerseMe provided free premium accounts for the experimental group. Additionally, ImmerseMe was used by the experimental group in a low-immersion VR mode. This decision was made since the VR lab (with headsets) was temporarily closed at the time due to COVID-19. Notably, we adopted ImmerseMe to explore its
potential for developing first-year L2 English students’ oral pragmatic abilities and to understand how students evaluated this experience. In this respect, this may inform language educators, researchers, practitioners, and VR developers concerning the efficacy of the L2 learning experience.

Procedure

At the beginning of the Spring 2022 semester, students in both sections of the Oral Communication II course answered an online background questionnaire to gather demographic information. In addition, all participants completed an Oral Discourse Completion Task (ODCT), which came from real-life situations of requests and apologies adapted by Liu (2007) and Ozet (2019). The ODCT included 16 prompts of various requests and apologies, which were dictated by virtual speech assistants of an AI tool (Podcastle.ai). Among the 16 prompts, the participants recorded what they would say in given scenarios involving requests or apologies. Students recorded their responses to the ODCT prompts in audio files (approximately one minute per file), which were then subsequently shared with the researchers for rating and analysis. The raters listened to the responses for each prompt and evaluated their appropriateness (reliability is discussed later). The tests were scored according to the appropriateness scale developed for measuring speech act performance (see Balci, 2009; Taguchi, 2006). We chose to adopt this scale since it has previously been validated and used to assess EFL learners’ pragmatic strategies of requests and apologies in Turkish contexts (e.g., Balci, 2009; Otcu & Zeyrek, 2008). In our adapted version, each question was worth 10 points, and the possible total score was 160. This initial ODCT served as the pretest to set a baseline and to ensure the experimental and control groups were not statistically different from each other.

During the semester, the instructor (also the first author of this paper) integrated 37 ImmerseMe tasks into the experimental group’s syllabus as both pre- and post-class activities over the span of six weeks. Before completing these tasks, the experimental group received training with ImmerseMe. In this 50-minute training, participants were first introduced to VR, and then they engaged in guided practice and individual practice on their own devices.

Students were given a certain number of tasks that they should complete each week, which were evenly distributed across Weeks 2–7 of the semester. Students were permitted to complete these tasks during the week at their own pace. The tasks also varied in length, with each task lasting anywhere from 5–15 minutes depending on both the task itself and how long students needed to complete it. To ensure progress, the instructor monitored students’ progress (using the app’s ‘Teacher Dashboard’). All students in the experimental group completed all 37 tasks.

To take an example, a task named “Apologizing for being a nuisance on public transport” (see a screenshot in Figure 1) was used to immerse students in the setting of a public bus, and students were expected to apologize at a certain point in the conversation. This is just an example, as some tasks were not specifically targeting or addressing speech acts (e.g., discussing the advantages of fair trade). In these scenarios, however, students were still required to interact with pre-recorded people within ImmerseMe to exchange ideas in a formal and polite way. Students received immediate feedback in the app by being informed whether they had been understood, and also by learning whether they had achieved a desired outcome (e.g., getting something they wanted). Notably, the tasks used in this study were selected either (a) because they were similar to or related to the course subject matter, and/or (b) because they covered target pragmatic areas that the study (and class) aimed to address.

Conversely, while the experimental group engaged in a series of VR tasks with ImmerseMe, the control group received more traditional classroom instruction (e.g., PowerPoint presentations, class discussions, and group activities). Outside of class, they were given other tasks, such as reading short texts and watching digital videos. These tasks/activities also targeted the same topics, oral communication skills, and pragmatic abilities as the experimental group.
After the six-week period (i.e., Weeks 2–7), all participants took the same ODCT as a posttest in Week 8. At that time, the first author also conducted semi-structured interviews with students in the experimental group. Since all students in the experimental group volunteered to participate in the interviews, 30 students were then interviewed. In English, students were asked three questions about their beliefs and experiences using VR/ImmerseMe, including questions such as: (1) whether they felt VR was enjoyable (or not) to use and why; (2) to what extent they felt using VR impacted their L2 learning and pragmatic abilities; and (3) if they would (or would not) continue using VR after the semester.

**Figure 1**

*Screenshot of a Task From the VR Platform ImmerseMe*

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**Analysis**

For RQ1, we analyzed the gain scores between the pretest and posttest for both groups who completed the ODCTs. All student responses to the ODCT test prompts of requests and apologies were rated by two L2 English teachers, who had experience teaching English oral communication in the study’s context. Prior to rating, the two teachers participated in a norming session with the first author. They then independently rated students’ responses to the pre-and post-ODCT tests using the 10-point appropriateness scale described earlier. Inter-rater agreement was calculated using an exact score match and was high (0.94). Prior to comparing the gain scores, we analyzed the pretest scores of both groups using an independent samples t-test. Assumptions were checked prior to running the test. The results showed that the two groups were not statistically significant at the beginning of the course ($t[58] = -1.21, p = .23$), which enabled subsequent comparisons.

At the end of the semester, to understand the effects of VR pedagogy on pragmatic competence, we compared the gain scores of the experimental and control groups from pretest-to-posttest. To measure such differences, we first conducted paired samples t-tests to examine the progress that each group made from pretest-to-posttest. Afterwards, we conducted an independent samples t-test to compare the average gain
scores that were made between the two groups. All statistical analyses were conducted using the software JASP (jasp-stats.org), and assumptions were checked prior to running the tests. In the Results section, in addition to reporting descriptive statistics, we report the effect sizes for the *t*-tests using Cohen’s *d*, which can be interpreted as small (*d* = .40), medium (*d* = .70), and large (*d* = 1.0) (see Plonsky & Oswald, 2014).

For RQ2, the audio recordings of the post-study semi-structured interviews from the experimental group were analyzed. To analyze the qualitative data, the audio recordings were first transcribed verbatim. Next, content analysis (see Creswell, 2012) was used to understand the emerging themes regarding students’ beliefs and perceptions. The first author used the qualitative software NVivo to label the emerging codes; then, the second author reviewed these codes. In the findings, we highlight multiple themes that emerged from the students’ comments, and when applicable, how frequently they occurred in the interview data.

**Results**

**RQ1: The Experimental and Control Groups’ Development of Oral Pragmatic Abilities**

To answer RQ1, we compared the gains that were made in the ODCT scores for the experimental and control groups. The descriptive statistics for both groups are provided in Table 1. As shown, although the two groups of L2 English learners appeared to begin the course at relatively different points on the pretest, these differences were not statistically significant. However, in moving from pretest to posttest, the experimental group who engaged in the VR tasks made greater gains in their overall scores. For the experimental group, the mean score difference was 14.2 points (SD = 14.8), while the control group’s mean score difference was 8.5 points (SD = 5.9).

**Table 1**

*Descriptive Statistics for the ODCT Test Scores*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Gain scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>M</em></td>
<td><em>SD</em></td>
<td><em>M</em></td>
</tr>
<tr>
<td>Experimental</td>
<td>127.1</td>
<td>16.3</td>
<td>141.3</td>
</tr>
<tr>
<td>Control</td>
<td>122.0</td>
<td>16.1</td>
<td>130.6</td>
</tr>
</tbody>
</table>

*Note. The maximum score achievable on the ODCT is 160.*

Notably, the results of paired samples *t*-tests showed that the gains each group made from instruction were statistically significant. For the experimental group, these gains were *t*(29) = -5.23, *p* < .001, CIs [-1.38, -0.52], with a medium-to-large effect size (*d* = -0.95). For the control group, these gains were also statistically significant *t*(29) = -8.03, *p* < .001, CIs [-1.98, -0.94], with a large effect size (*d* = -1.47). However, when comparing the differences between the two groups’ gain scores, the results of an independent samples *t*-test showed that these gains were not statistically significant *t*(58) = -1.95, *p* = .056, CIs [-1.02, 0.01]. That being said, the *p*-value is approaching significance, and the effect size is small-to-medium in nature (*d* = -0.50). This finding is revisited later in the Discussion section.

**RQ2: The Experimental Group’s Perceptions of Using VR**

As for RQ2, the students in the experimental group participated in post-study interviews, in which they reflected on their experiences in adopting ImmerseMe and VR for learning English. Analyses revealed three major themes that emerged as a result of students’ responses to the three interview questions that were posed. These included students discussing (1) general positive stances towards VR and ImmerseMe, (2) impacts on L2 pragmatic abilities, and (3) issues and challenges with using VR for L2 learning.

In terms of the first theme, which was general positive stances towards VR and ImmerseMe, most participants (25 of 30, 83.3%) reported enjoying the experience of using the VR application. For many learners, this was the first time they had experienced VR technology. As such, although some students did
not enjoy the experience (e.g., P#12 stated it made them feel “dizzy”), most learners tended to make relatively generic, positive comments. For example, students stated:

Excerpt 1 (P#05)

*It is great to use virtual reality tools because it is exciting, and we will use this technology more in our life in the near future. Until this experiment, I didn’t have any experience.*

Excerpt 2 (P#26)

*ImmerseMe can be very useful because some people do not have opportunities to communicate with foreigners. Also, we can't travel easily nowadays. ImmerseMe provides a setting at least.*

As these two excerpts indicate, some participants like P#05 generally enjoyed the experience of utilizing VR and *ImmerseMe*. In addition to finding it useful, some of the participants — such as P#26 — commented on how the VR technology afforded them and their classmates the opportunity to communicate in the TL with speakers outside of their country.

The second theme that emerged from the semi-structured interviews involved students discussing VR’s impact on L2 pragmatic abilities. Within this theme, very few students believed that VR did not positively influence their oral communication and pragmatic abilities (e.g., P#3 made a general statement of “[I think] there is no effect”). However, most students (26 of 30, 86.7%) were positive in their assessments, discussing how the integration of VR tasks impacted their development. For example, when reflecting on the influence of VR tasks in the curriculum, one student stated:

Excerpt 3 (P#05)

*I am not sure if I am good at syntax, but I [now] know how to talk and where to talk properly. So, I think in terms of pragmatic strategies, I can communicate appropriately.*

Like P#05, another student expressed a similar sentiment, stating that prior to engaging in the VR tasks, her English conversational skills lacked pragmatic appropriateness:

Excerpt 4 (P#19)

*I personally don't think that I speak English in a rapport with a pragmatic context most of the time. But [now] sometimes I somehow manage to do that.*

Thus, as these excerpts suggest, some students in the experimental group commented on the influential nature of adopting VR tasks in the classroom. In particular, some learners perceived the VR tasks with *ImmerseMe* as having a positive influence on their capacity to use appropriate pragmatic strategies in given situations.

The third and final theme that emerged from the post-study interviews involved students discussing various issues and challenges with using VR for L2 learning. That is, although most of the students in the experimental group generally reported positive experiences with the VR tools and tasks, a handful of students also faced challenges (e.g., feeling uncomfortable using the technology, or being understood by the software). Some of these challenges were shared among the learners, while other perceived drawbacks were more idiosyncratic in nature. For instance, some learners stated:

Excerpt 5 (P#02)

*It's not necessary for me. I don't know about others, but I would rather talk to living people... [Also,] since its oral communication technology, [it] wouldn't be as effective as a human mind. We need to talk with humans and not with robots. I tried talking with AI, and they didn't even understand what I was saying even though my pronunciation was good. I prefer living humans, not virtual technology.*
Excerpt 6 (P#30)

It was a little bit sad when I had to repeat myself to be understood by the tool.

As these two excerpts illustrate, some of the students, like P#02, strongly preferred speaking to a human over engaging with VR. As this excerpt also shows, the student believed that his pronunciation was already strong. Therefore, when the VR ImmerseMe application did not understand his oral responses, this challenge led to frustration. Excerpt 6 also highlights a similar sentiment that was shared by a peer. However, instead of experiencing frustration, this caused P#30 to feel a sense of disappointment in their skills.

Discussion and Conclusions

The current classroom-based study investigated the integration of VR tasks into an undergraduate L2 English curriculum in Turkey. Specifically, we explored the extent to which a series of VR tasks influenced an experimental group’s development of oral pragmatic abilities (RQ1), along with students’ general perceptions of using VR for language learning (RQ2). In terms of RQ1, the results suggest that VR has the capacity to positively influence L2 learners’ development of pragmatic competence, since the experimental group made statistically significant gains from pretest-to-posttest. Similar to previous CALL studies that have adopted VR for various purposes (see Chen et al., 2022; Dhimolea et al., 2022; Thrasher, 2022; Xie et al., 2019), the current study supports the notion that VR technologies have the potential to be an effective means of promoting certain areas of L2 development. In particular, the current study complements recent work by Taguchi (2022), in which Taguchi theorized that VR may have benefits, particularly for the learning of L2 pragmatics.

That being said, we note here that the control group also made significant gains from more traditional instruction (involving readings, worksheets, and videos), which were large in size. When the experimental group’s gains were compared to those of the control group, the differences were not statistically significant. However, the results showed that the \( p \)-value was approaching significance with a small-to-medium effect size. This leads us to speculate that had the VR treatment lasted longer than six weeks, it is possible that significant differences would have emerged between the two groups (see Kessler et al., 2023 for a related discussion). Because of this, we echo Bahari’s (2021) call for future teachers and researchers to investigate the nexus of VR technologies and pragmatics learning, particularly since there is relatively limited research in this area. Replications of the current study are strongly encouraged, in which researchers use the same (or similar) VR applications and tasks as a means of exploring VR’s influence on aspects of pragmatic competence such as making requests, apologies, and/or other targets. In addition, studies are also needed that compare the relative effectiveness of two or more different VR apps, since such research is currently lacking in the published CALL literature.

In turning to RQ2, our findings also reinforce the utility of integrating VR tasks into the L2 curriculum. Specifically, the comments that were made by students during the post-study interviews suggest that many of the learners positively perceived the integration of VR tasks into the curriculum (see Excerpts 1-2). Some students also perceived the tasks as being uniquely beneficial for the development of pragmatic competence in the TL (see Excerpts 3-4). Thus, our findings are in line with previous studies such as Thrasher (2023) and Xie et al. (2019), in which L2 learners generally report positive experiences and/or believe that the use of VR encourages more interactive and immersive learning. However, we do believe it is important to note that not all of the students’ experiences were positive. That is, although most students reported good experiences, a handful of L2 learners in the experimental group experienced challenges, particularly when it came to using the technology itself. Some of the learners experienced issues with the voice recognition software (see Excerpts 5-6). Such issues may or may not have been a result of the software itself. Unfortunately, we are unable to comment on or draw conclusions about this particular issue since we did not audio record students as they engaged in the VR tasks. As such, future research is needed in this domain, particularly involving issues of oral production and perception with VR, and how such challenges may impact aspects of students’ L2 learning, such as their identity and/or motivation.
We close this piece with a brief discussion of the pedagogical implications, including recommendations for practitioners. Specifically, this study revealed that the integration of VR tasks into the L2 curriculum might be a worthwhile endeavor, particularly if teachers have the institutional resources to do so. Not only did the use of the VR tasks positively influence our L2 English learners’ development of oral pragmatic competence, but importantly, the students also generally seemed to enjoy the experience in these tasks. Admittedly, the use of VR in the current course context was rather expansive (i.e., lasting six weeks in total). Yet, teachers who are interested in exploring VR’s capabilities do not need to make such large, sweeping changes to their curricula all at once. For instance, instructors might consider integrating one small unit that adopts VR tasks (e.g., 1–2 weeks of activities). Instructors might also even consider making VR activities an extra credit assignment for students. This way, teachers can gain a better understanding of both the technology and their students’ perceptions prior to formally implementing it.

In closing, we encourage teachers to experiment with the use of VR tasks in their own language courses and contexts. We hope that instructors in FL contexts will consider leveraging VR technologies since they have the capacity to place students in a (semi)-realistic context and to engage with the TL in interactive and meaningful ways. By doing so, instructors may provide their students with additional input and access to L1 speakers, which can be beneficial for learning and development.

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References


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