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Effects of Interleaving on Indian Adult ESL Learners' Oral Interaction in English

Sarat Kr Doley [1,*]

[1] Department of English, Tezpur University; dolesar@tezu.ernet.in
* Correspondence: dolesar@tezu.ernet.in

Scopus Author ID 57205352176

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Abstract: The mixing and spacing technique used in interleaving has been described to facilitate memorization and transfer of learning more effectively than blocking. The principal objective of the present study was to examine the difference in the effect of interleaving and blocking on interaction performance in English during a three-month-long L2 training programme. The study measured the difference in the effect of the two methods at various stages of the training programme. Two groups of 44 Indian undergraduate English as L2 learners practised interaction in English using interleaving and blocking. One interaction test for the distribution of the participants into interleaving and blocking groups and three interaction tests to measure the difference in the effect of the two methods on the interaction performance of the participants at various stages of the training programme were taken to collect data for the study. The p-value of the comparison calculated using a repeated measures ANOVA test was 0.81 reflecting a similarly low F-value of 0.061 and effect size of 0.003. Although no significant positive effect of interleaving and blocking on interaction performance in English was observed in the study, blocking demonstrated a slightly better interaction performance than interleaving.

Keywords: interleaving; blocked practice; L2 interaction; English language education; desirable difficulty

1. Introduction

Interaction strategies that people adopt in various communicative contexts constrain and regulate language learning [e.g.,1-4]. Language competence is the result of social interactions and participation in communication with experienced, knowledgeable, and competent interlocutors [4]. Interaction, as per the communicative approach to language teaching, is the primary means of L2 learning accomplished in a classroom or elsewhere [5]. It is an effective collaborative exchange of thoughts, feelings, or ideas between people [6]. It provides opportunities for conversational negotiation and linguistic adjustment needed to create comprehensible input resulting in the acquisition of language [7-9]. Facilitating ample opportunities for the use of an L2, interaction makes language learners aware of linguistic errors and the need to reconstruct the production of language [10].

A language classroom is often cited as a platform for conversation exchange systems involving oral interactions. These systems may cooperatively operate both between teacher and learners and among learners themselves reflecting the different dimensions of the larger social interactions playing outside the classroom [11,12]. Here, teachers generally take the agentive role in matters such as modification and simplification of classroom interactions for learners' comprehension, correction or facilitation of feedback to learners' errors, and initiation and shaping of classroom interaction [13-15]. As most activities in the classroom involve the use

of language, the basic purpose of the teacher's agentive role in creating occasions for oral interaction in the classroom is to provide ample opportunities for language practice. General activities like learners' access to new knowledge and skill, identification of problems, and establishment and management of relationships both between teacher and learners and among peers in a language classroom are all conducted through interaction in a language [15,16]. Learner-teacher interaction has been particularly identified as vital both for the social improvement of the learners and for the achievement of communicative competence in the target language [13].

Analysis of classroom interactions in L2 and learners' perception of such interactions have demonstrated an asymmetrical pattern of conversation in which the learners experience limitations in their oral proficiency while the teachers are expected to possess superior communicative competence in the L2 both for classroom management and for the development of the oral proficiency of the learners [12]. Since the role of the teacher in classroom interaction is predominantly agentive, teachers initiate, maintain, and control the direction and nature of the interactions that may have a significant impact on the magnitude of participation by the learners on such occasions of interactions [4, 17].

Oral interactions in L2 learning involve a great amount of language practice. In recent studies on the methods of maximizing such language practice in L2 classrooms, the method of combining and fusing different forms of practice known as interleaving has been identified as extremely useful [e.g., 18-25]. The sets of skills or tasks identified for task repetition in interleaving are arranged in an unpredictable sequence using the technique of spacing and mixing. The drill pattern of the learners moves from the practice of one set of skills to another set of skills in an unpredictable order. If L2 learners, for instance, are required to practise three interrelated language tasks of A, B, and C, these tasks may be arranged by mixing and spacing them as ABC, ABC, and ABC. Here, the practice of task A is separated by tasks B and C with spacing between the tasks [21]. This method of practice has been described as effective in allowing the learners to distinguish and understand various forms and structures of language through contextual interference incorporating the benefits of memory and transfer both in concept learning and the learning of other skills of language [e.g., 6, 26-34]. In a study on vocabulary learning, the speed of response in recalling 32 pseudo-words was recorded to be faster among learners using interleaving than among learners using blocking [35]. Interleaving is more effective than blocking in the retention of L2 grammar and vocabulary [36, 37]. Since interleaving provides opportunities for multiple sessions of practice, it can introduce the element of spacing into such practice sessions leading to more effective learning than blocking [38]. The same benefits involving interleaving were observed in other studies too [e.g., 39, 40]. In one such study [41], students who learned to calculate the volume of four different types of solid figures after the shuffling of the volumes in an interleaved sequence scored higher than the students who learned to calculate the same volume of solid figures in a predictable order of simple to complex. In an experiment involving the classification of paintings, interleaving performed better than blocking [29]. Interleaving performed better than blocking even in the identification and differentiation of various species of birds.

Both methods have also been successfully employed in the learning of different forms of items. Interleaving is found to be effective in learning algebraic rules while learning to identify degrees of varying line segments [42] has been found easier to retain in blocked

practice. Blocked practice is more effective than interleaving in the learning and retention of similarities of patterns within and between low-similarity categories of the exemplars [43]. Contrariwise, interleaving is more effective than blocking in the learning and retention of high-similarity categories in which all the exemplars share a high level of similarity with the others in the category in addition to the exemplars in different categories [44]. Since both methods have been found effective, some studies have preferred the use of a mixed method [e.g., 45-47]. Blocking may help identify the similarities within a single category while the learning to make a clear distinction among different categories may be taught using interleaving [28].

Although interleaving has been observed to be more effective than blocked practice in several studies on L2 learning [e.g., 35-38], definitive results in favour of interleaving have not been recorded in all such studies [e.g., 30, 48, 49, 50, 51]. In a study on L2 grammar learning [30] involving two groups of English-speaking students practising two grammar rules of preterite and imperfect past tenses in Spanish, interleaving was not found to be more effective than blocking in the first two tests, but no significant difference was observed between interleaving and blocking. Identifying the specific benefits of both methods, some L2 studies have stated that interleaving might be useful for experienced learners while beginners might be more effectively taught using blocked practice [39]. Citing the effect of the desirable difficulty framework, both methods have been considered relevant in the long-term retention of skills presented at the appropriate level of difficulty [46]. Since interleaving might be inappropriate for beginners with low language proficiency, blocking has been suggested at the early stages of learning. Interleaving may be used for proficient learners as contextual interference increases involving a greater amount of practice [45,46]. Interleaving may create stress in the initial performance, but it has been observed to facilitate long-term retention [52]. The initial stages of learning in blocking may, however, appear faster than in interleaving without facilitating long-term retention [33].

Considering the importance of interaction in L2 learning and the positive effect of interleaving on certain domains of L2 learning, the present study is an attempt at measuring and comparing the difference in interaction performance of two groups of learners-an interleaved (IL) and a blocked practice (BP) group-during three-month-long scheduled interaction sessions (SISs). During the SISs, the groups were given role-playing sessions in which the instructors encouraged them to respond to various questions related to both personal and academic issues in their life. The prime focus of investigation in earlier studies on classroom interaction in L2 was predominantly on discourse analysis of classroom interactions either between teacher and learners or among learners themselves highlighting the speech dimensions of the discourses [e.g., 4, 17]. The focus of such studies has also been on the description of the socio-cultural dimensions of such interactions [e.g., 15, 53, 54]. Little attention, however, has been paid to the possibility of increasing L2 interaction in the classroom, either between teacher and learners or among learners themselves, by manipulating the sequence of L2 practice sessions. Since classroom interactions in L2 may have significant relevance in the development of L2 proficiency [e.g., 7-9], exploration of the various effective ways to create maximum opportunity for such interactions in the L2 classroom might be considered a worthwhile contribution to L2 study. Since the spacing and mixing technique used in interleaving is an effective method of practice at the more experienced level of L2 learning [e.g., 18, 19, 21-25], the present study attempts at an examination of this fact, by comparing it

with the effect of the predictable sequencing method in blocking, concerning the interaction performance of adolescent Indian L2 learners with a 12-15 years' experience of learning English as an L2. Additionally, the present study attempts to compare the two methods both at the initial stages and the final stages of the SISs as performance variations in the effect of the two methods at various stages of learning have been observed in certain studies [39]. Taking these objectives into account, the present study proposed the following three research questions:

1. Is there any significant difference in interaction performance in English between BP and IL in the initial phase of the SISs?
2. Is there any significant difference in interaction performance in English between BP and IL in the final phase of the SISs?
3. Is there any significant difference in the progression of interaction performance in English between BP and IL during the three rounds of SISs?.

2. Materials and Methods

2.1. Research Design

Following an experimental research design, the participants of the study were divided into BP and IL groups, and they were given interaction practices in English for three months. The three-month-long SISs was divided into three rounds of one month each. A pre-test (IT 1) was administered before the start of the SISs to select and distribute the participants into IL and BP. Two intermediate tests after the end of the first two rounds and one post-test at the end of the third round were further taken to measure the interaction performance of the groups at different stages of the SISs. The participants in BP were given English interaction practice using blocking while the ones in the IL were given the treatment of interleaved practice.

The SISs for both groups were conducted as part of an English as an L2 learning project undertaken at Tezpur University, India in the autumn semester (July- December) of 2021. The initial plan of the SISs was for a face-to-face mode of instruction and the official permission for the offline training at the Department of English of the university was obtained from the university authority. The arrangements for the offline SISs, however, had to be cancelled as the COVID-19 lockdown, declared in the country in March 2020, continued till October 2021. The SISs of all three rounds and the oral interactions used in the four interaction tests for both groups were conducted online.

2.2. Participants

After an online oral interaction with a section of undergraduate students enrolled in various degree programmes in the school of sciences at Tezpur University, India, 44 students were recruited for the study. The participants belonged to the age group of 18-19 years. The online oral interaction was on English classroom expectations of the students in which they interacted with the instructor through Google meet. This online oral interaction was used as the IT 1 of the study. The oral responses of the students were assessed and the mean values of the English interaction scores in IT 1 were used as the criterion for the selection and distribution of the participants to IL and BP (see Table 1). At the beginning of the SISs, there were 44

learner participants- 22 in IL and 22 in BP- but 2 participants in IL in the second round and 1 participant in BP in the third round opted out of the SISs. It is stated here that the outliers in IT 1 were equally distributed between the two groups during the division of the learner participants into IL and BP.

Table 1. Interaction performance of the participants in IT 1

Speaking skill	Test mode	Sex		Age (in years)	
		Male *M* (*SD*)	Female *M* (*SD*)	18 *M* (*SD*)	19 *M* (*SD*)
Interaction	Online Interaction (OI)	3.26 (1.13)	3.28 (0.76)	3.20 (0.68)	3.32 (1.12)

2.3. Materials and Activities in the SISs

There were 12 major areas of interaction practice (AIPs) identified in a needs analysis using the learners' responses about their expectations from English language courses and these AIPs were distributed across the three rounds of SISs. Four lesson practices (LPs) were further identified for each of these 12 AIPs (see Table 3). In Round 1 of the SISs, there were 16 LPs corresponding to the 4 AIPs of personal introduction (a), about hobby (b), talking about one's native place (c), and about strengths and weaknesses (d). In Round 2 of the SISs, there were 16 LPs corresponding to the 4 respective AIPs of about favourite subject (e), internship experience (f), leadership (g), and skills in management (h). Round 3 of the SISs consisted of 16 LPs corresponding to the 4 remaining AIPs: introducing oneself in a presentation (i), presenting a content (j), presenting an analysis (k), and concluding a presentation (m).

The participants were shown a YouTube video related to a particular LP at the beginning of an SIS. Video clips showing the sentences to be practised were played with a voice reading the sentences aloud three times (see Table 2). Separate individual PPT slides of the sentences were also presented to the participants to facilitate revision. The participants were required to practise speaking these sentences by performing some fill-in-the-gap and scrambled sentences exercises on the sentences. The most important exercise for practice of interaction in English was the role-playing episodes following the writing exercises. The learners responded to the teachers' questions related to the LPs by using the sentences practised during the SISs.

2.4. Sequence of the LPs

The 48 LPs in the three rounds of SISs were arranged in different orders in IL and BP (see Table 3). Practising the LPs in BP as per difficulty and relatedness, they were arranged in a predictable sequence in which the a1 LP in a was followed by a2, a3, and a4 in an order of relatedness in the first 4 days of the Round 1 of the SISs. The next LPs of b presented in the second week of the first round of the SISs were arranged in the sequence of b1b2b3b4following the same predictable order of relatedness and difficulty. The sequences of the 40 LPs in the rest of the weeks in the three rounds of the SISs were arranged similarly in BP. On the contrary, the LPs in IL were mixed using the interleaved sequence of acbd, abbd, aacc, bdcd in all three rounds of the SISs. In the first four days of the first round of the SISs in IL, a1 LP was followed by c1, b1, and d1 LPs from the four different AIPs of a, c, b, and d respectively. The next three

weeks of the first round of SISs in IL followed the interleaved sequence of a2b2b3d2, a3a4c2c3, and b4d3c4d4 respectively (see Table 3). The remaining 32 LPs in the next two rounds of the SISs repeated the same interleaved order in IL.

Table 2. Sentences used for Interaction on Day 1 and 2 of Round 2

Day	BP		IL	
	LPs	**Sentences**	**LPs**	**Sentences**
1	*e1	1. "I have to say that my favourite subject is Physics.	e1	1. "I have to say that my favourite subject is Physics.
		2."I always prefer studying Physics more than any other subject because it is challenging and interesting."		2."I always prefer studying Physics more than any other subject because it is challenging and interesting."
		3. "I want to be a theoretical physicist and my inspiration is Albert Einstein."		3. "I want to be a theoretical physicist and my inspiration is Albert Einstein."
		4. "A not so academically inclined student, from a humble background, going on to change the way we see the world, is what inspires me about Einstein."		4. "A not so academically inclined student, from a humble background, going on to change the way we see the world, is what inspires me about Einstein."
		5. "There are various other people in the field of Physics who have been my inspiration." 6. "They dedicated their entire lives for science and discovered secrets of nature that helped this world become a better place to live in."		5. "There are various other people in the field of Physics who have been my inspiration." 6. "They dedicated their entire lives for science and discovered secrets of nature that helped this world become a better place to live in."
2	e2	1. "I like science because of the real-life impact it has on our lives.	g1	1."I have had several leadership roles in the past."
		2. "It has the potential to solve many problems in the world such as water problem, climate change, mental distress and other medical problems."		2. "I generally encourage my team to set goals that directly align with the goals of the company."
		3."Given the gravity of the impact that science has on our lives, I could not turn my eyes away from studying it." 4. "It has the potential to solve many problems in the world such as water problem, climate change, mental distress and other medical problems."		3. "In my previous position, I met with my team once every quarter to review company objectives and track the progress of overall team goals." 4. "During one of our meetings, we discovered that our most recent goal was too department-focused." 5. "We had lost sight of how it helped the company." 6. "We adjusted our team goal to clearly address quality issues that were affecting our company." 7. "I also met with each team member individually to help them outline personal workplace goals." 8. "This transformational leadership style, if I may say so, enabled my team to address the overall company goals and improve the quality of our work."

*See Table 3 for details

2.5. Interaction Test in English

Four interaction tests in English- IT 1, IIT 1, IIT 2, and IT 2- were conducted during the study. The participants were required to respond in English to the teachers' questions on their personal and professional life using the sentences learned during the various SISs. Since the participants were undergraduate students at a university with English learning experience of 12-15 years, they already had at least a working oral proficiency in English. The sentences practised during the SISs could be used by the participants during the tests whenever they required readymade expressions related to a certain topic. This was done to ensure that the frequency of interaction of the participants was not affected by a lack of fluency in English. The recording, transcription, and evaluation of the oral responses of the participants were done

in all four tests. Four assessors, experienced teacher researchers in English, were involved in the evaluation of the responses and they used the assessment criteria for interaction tests specified by the Central Board of Secondary Education (CBSE), India. The 5-point assessment criteria for interaction tests in English prepared by the CBSE (2012) contained an assessment scale from "very limited interaction" (point 1) to appropriate turn-taking (point 5). The other three descriptors were unrelated oral contribution (point 2), a requirement of prompting in turn-taking (point 3), and adequate initiation and development of interaction (point 4).

Table 3. Sequences of the *LPs in IL and BP

Weeks	SIS Round 1		SIS Round 2		SIS Round 3	
	LPs in IL	**LPs in BP**	**LPs in IL**	**LPs in BP**	**LPs in IL**	**LPs in BP**
Week 1	*a1*	*a1*	*e1*	*e1*	*i1*	*i1*
	c1	*a2*	*g1*	*e2*	*k1*	*i2*
	b1	*a3*	*f1*	*e3*	*j1*	*i3*
	d1	*a4*	*h1*	*e4*	*m1*	*i4*
Week 2	*a2*	*b1*	*e2*	*f1*	*i2*	*j1*
	b2	*b2*	*f2*	*f2*	*j2*	*j2*
	b3	*b3*	*f3*	*f3*	*j3*	*j3*
	d2	*b4*	*h2*	*f4*	*m2*	*j4*
Week 3	*a3*	*c1*	*e3*	*g1*	*i3*	*k1*
	a4	*c2*	*e4*	*g2*	*i4*	*k2*
	c2	*c3*	*g2*	*g3*	*k2*	*k3*
	c3	*c4*	*g3*	*g4*	*k3*	*k4*
Week 4	*b4*	*d1*	*f4*	*h1*	*j4*	*m1*
	d3	*d2*	*h3*	*h2*	*m3*	*m2*
	c4	*d3*	*g4*	*h3*	*k4*	*m3*
	d4	*d4*	*h4*	*h4*	*m4*	*m4*

*LPs: introducing oneself *(a1)*, educational information *(a2)*, family introduction *(a3)*, personality information *(a4)*, principal hobby *(b1)*, fitness concerns *(b2)*, reading habits *(b3)*, relatives *(b4)*, native place *(c1)*, livelihood *(c2)*, weather and climate *(c3)*, memories of the place *(c4)*, about qualities *(d1)*, principal quality *(d2)*, related qualities *(d3)*, and a weakness *(d4)*, one's favourite subject *(e1)*, eagerness in the subject *(e2)*, future prospects *(e3)*, general subjects of interest *(e4)*, one's experience during internship *(f1)*, one's core interest in the company *(f2)*, about teamwork *(f3)*, experience in the project *(f4)*, leadership qualities *(g1)*, conflict in teamwork *(g2)*, decision-making *(g3)*, challenges in leading team *(g4)*, about management *(h1)*, management experience *(h2)*, handling adversities *(h3)*, and one's achievement in management *(h4)*, greeting the audience *(i1)*, one's introduction *(i2)*, introduction of the topic *(i3)*, acknowledging *(i4)*, presenting the overall content *(j1)*, about the topic in brief *(j2)*, definition of the topic *(j3)*, about background information *(j4)*, justification of the topic *(k1)*, data presentation *(k2)*, about data explanation *(k3)*, presenting findings & analysis *(k4)*, about implication *(m1)*, concluding a presentation *(m2)*, answering questions from audience *(m3)*, and suggestions from audience *(m4)*

2.6. Data Collection and Analysis

The interaction scores collected in IT 1, as stated already, were used for the distribution of the participants into IL and BP. Three separate tests at different stages of the SISs- IIT 1, IIT 2, and IT 2- were administered to collect data about the interaction performance of the participants in both groups at different points in time during the SISs. Using descriptive and inferential statistics in SPSS 26.0, the interaction scores collected in the three tests after the end of each round were calculated and analysed. The mean values and the standard deviations of the interaction scores collected in the three tests administered to both groups during the SISs were analysed using a t-test to measure the difference in interaction performance of IL and BP at different stages of the SISs separately. One-way repeated measures ANOVA test was

performed to measure the difference in the rate of progression shown by IL and BP in interaction performance in the three rounds of the SISs taken together.

3. Results and Discussion

3.1. Difference in Interaction Scores in the Initial Phase of SCSs

The first objective of the study was to measure the difference in the effect of blocking and interleaving on the English interaction performance of the participants in the initial two rounds of the SISs. Accordingly, the first research question posed in the study was: is there any significant difference in the interaction performance in English between IL and BP in the initial phase of the SISs? The difference in the effect of blocking and interleaving on the English interaction performance of the two groups of learners in the study at the initial stage was measured by comparing and analysing the mean values of the English interaction scores secured by IL and BP in IIT 1 and IIT 2 (see Table 4).

Table 4. Differences in interaction performance in the intermediate tests

Speaking skill	Test mode	Group	IIT 1 *M* (*SD*)	IIT 2 *M* (*SD*)	*df*	*F*	Sig.	Effect size[a]
Interaction	OI	IL	2.82 (1.35)	2.47 (1.25)	1	.113	.74	.004
		BP	2.96 (1.99)	2.73 (1.84)				

[a]Partial Eta^2

Both groups performed equally in IIT 1 as the mean values of the English interaction scores of IL and BP in the test were 2.82 and 2.96 respectively. A similar trend was observed in IIT 2 as the mean values of English interaction scores of IL and BP in the test were 2.47 and 2.73 respectively. The minor spikes for BP in both tests (2.96 and 2.73) in the first two rounds of the SISs were statistically insignificant and they may be interpreted as influenced by differences in the assessors' subjective assessment standards. They may also be interpreted as caused by an outlier in BP as the SDs (1.99 and 1.84) of the mean values in IIT 1 and IIT 2 in the group were a little higher than the SDs (1.35 and 1.25) of the mean values in IIT 1 and IIT 2 in IL. Nonetheless, the effect of the outlier in BP on the overall English interaction scores of the group was substantially low. Even though these minor differences in the mean values of the English interaction scores were measured in IIT 1 and IIT 2, no statistically significant difference between IL and BP was observed in the English interaction performance in the initial phase of the SISs. The *p*-value of the comparison of English interaction scores between IL and BP in IIT 1 and IIT 2 was .74 reflecting a low F value of .113 and an insignificant effect size of 0.004.

Table 5. Differences in interaction scores in the post-test

Speaking skill	Test mode	Group	IIT 2 *M* (*SD*)	IT 2 *M* (*SD*)	*df*	*F*	Sig.	Effect size[a]
Interaction	OI	IL	1.92 (1.52)	2.43 (1.81)	1	.51	.483	.017
		BP	2.54 (2.01)	2.74 (2.13)				

[a]Partial Eta[2]

3.2. Difference in Interaction Scores in the Final Phase of SCSs

The second research question of the study was: is there any significant difference in the interaction performance in English between IL and BP in the final phase of the SISs? The objective of this research question was to measure the difference in English interaction scores, if there was any, between IL and BP in the final phase of SISs.

The mean values of the English interaction scores of IL and BP secured in IIT 2 and IT 2 were compared and analysed to measure the difference in performance between the two groups in the final phase of the SISs (see Table 5). One important point to note here is that the mean values of the English interaction scores of IL and BP in IIT 2 were recalculated after excluding the four participants (two from IL and two from BP) who opted out of the SISs by the end of the third round and did not appear for IT 2. Consequently, the mean values of the English interaction scores of both groups in IIT 2 (see Table 4) were slightly different from the mean values of the scores in IIT 2 presented here (see Table 5). It may also be stated here that the absence of the English interaction scores of the dropouts should not affect the general trend of the scores observed in the first two rounds of SISs for both groups considering the small number of such cases.

The mean values of the English interaction scores of IL and BP in IIT 2, after excluding the interaction scores of the dropouts, were 1.92 and 2.54 respectively. The participants in both groups showed a slightly better performance in IT 2 than in IIT 2 as the mean values of the scores grew to 2.43 from 1.92 in IL and to 2.74 from 2.54 in BP. This growth in the mean values of the interaction scores observed in IT 2 (see Table 5) was in contrast to the minor decline in interaction scores recorded in the initial phase of the SISs (see Table 4). It may, however, be noted that the difference in the mean values of the interaction scores in IIT 2 and IT 2 for both groups was not significantly high. Here also, the twin influence of subjective assessment preferences of the concerned assessors and the presence of an outlier in BP on the interaction scores in BP might be taken into sight. The *SD*s of the mean values of the interaction scores in BP in IIT 2 and IT 2 (2.01 and 2.13 respectively) were slightly higher than the *SD*s of the mean values of the interaction scores in IL in IIT 2 and IT 2 (1.52 and 1.81 respectively). In this context too, the difference between IL and BP in English interaction performance was not statistically significant (*p*-value .483). The *F*-value of .51 was substantially low as was the effect size of .017 (see Table 5).

3.3. Difference in English Interaction Skills in the Three Rounds of SISs

Another important objective of the study was to measure the difference in the progression of English interaction performance between IL and BP from the first round through the second to the end of the third round of the SISs. To collect data concerning this progression in

interaction skills one more research question was posed. More specifically, the third research question of the study was: is there any significant difference in the progression of interaction performance in English between BP and IL during the three rounds of SISs?

As stated in the section on the difference of interaction scores in the final phase of the SISs above, the English interaction scores of only those participants in IL and BP who participated in all three rounds of the SISs were calculated for the comparison of the mean values in the three tests (see Table 6). There were two dropouts in the second round of the SISs who rejoined the sessions in the third round, but their interaction scores in IT 2 were excluded from the final calculation and comparison of the mean values of the interaction scores in the three tests. So, the mean values of the interaction scores in the three tests shown here (see Table 6) were slightly different from the mean values of the scores in the three tests calculated earlier (see Table 4 and Table 5). As stated earlier too, the difference in the mean values of the interaction scores (see Table 6) calculated after the exclusion of the dropouts should continue to reflect the general trend of progression in English interaction performance (see Table 4 and Table 5) through the three tests.

Table 6. Progression in interaction skill in the three rounds of SISs

Speaking skill	Test mode	Group	IIT 1 *M* (*SD*)	IIT 2 *M* (*SD*)	IT 2 *M* (*SD*)	*F*	Sig.	Effect size[a]
Interaction	OI	IL	2.82 (1.35)	2.46 (1.25)	3.12 (1.40)	.061	.81	.003
		BP	2.98 (1.96)	2.82 (1.86)	3.09 (2.01)			

[a]Partial Eta^2

The mean values of the English interaction scores of IL in IIT 1, IIT 2, and IT 2, after excluding the interaction scores of the dropouts, were 2.82, 2.46, and 3.12 respectively. The mean values of the English interaction scores of BP in the three tests, after excluding the interaction scores of the dropouts, showed a similar trend. The mean values were 2.98, 2.82, and 3.09 in IIT 1, IIT 2, and IT 2 respectively. Unlike what was observed in the mean values of the interaction scores in both groups in IIT 1 and IIT 2, the mean value of the interaction scores of IL was slightly higher than the mean value of the interaction scores of BP in IT 2. It is, however, not substantial enough to be regarded as of any statistical significance. Once again, it may be interpreted as influenced by the subjective assessment preferences of the four assessors in the study. The presence of an outlier in BP could not be dismissed even here as the *SD*s (1.96, 1.86, and 2.01) of the mean values for BP in the three tests were a touch higher than the *SD*s (1.35, 1.25, and 1.40) of the mean values for IL. It may, however, be noted here that the mean values of the interaction scores of IL and BP in IIT 1, IIT 2, and IT 2 demonstrated no statistically significant difference at any stage of the SISs. The *p*-value of .81 after the statistical comparison was very low as were the *F*-value of .061 and the effect size of .003.

No statistically significant difference in the effect of interleaving and blocking on the English interaction performance of the participants in IL and BP was observed in the present study, in contrast to several studies demonstrating the positive effect of interleaving on L2 learning [e.g., 6, 21, 30, 33, 23, 25]. In conformity with some studies that did not observe a statistically significant difference in the effect of interleaving and blocking on L2 performance

[e.g., 27, 49, 50, 51, 55], the findings of the present study either registered slightly more favourable results for the use of blocked practice instead of interleaving at certain phases of the SISs or pointed towards no significant difference in the effect of the two methods of practice on interaction performance of IL and BP in the three rounds of the SISs.

The methods of interleaving and blocking did not demonstrate any statistically significant difference in their effect on the interaction performance of the participants in the two groups in the initial phases of the SISs. Neither the participants in IL nor the ones in BP showed any significantly noteworthy interaction performance in the first round of the SISs. The participants in both groups were generally passive in the development of conversation; and even when they tried to contribute to the conversation with the teachers their contributions were very remotely related to the central topic of the conversation. On the contrary, a little downward curve in the interaction performance of the participants in both groups was registered in the second interaction test administered after the end of the second round of the SISs. It is, however, stated here that this downward curve in the interaction performance of both groups in the second intermediate interaction test might have been caused more by a minor variation in the subjective assessment standards followed by the four assessors than by any significant drop in the interaction performance of the participants. Since the downward curve in interaction performance in the concerned tests was recorded in both groups, this minor change in the mean values of the interaction scores might not be considered significant. It may, however, be noted here that the method of blocking proved to have a slightly more positive effect on the interaction performance of the participants than the method of interleaving in the first two intermediate interaction tests in English in conformity with similar findings about the effect of blocking on L2 learning in some studies in the past [e.g., 49, 50, 51].

The use of the methods of interleaving and blocking did not show any significant difference in effect on the interaction performance of the participants even in the final phases of the SISs. Neither the participants in IL nor the ones in blocking demonstrated any noteworthy progress in the final interaction test in English conducted at the end of the third round of the SISs. Although both groups demonstrated a slightly better performance in the last interaction test administered at the end of the third round than in the second intermediate test after the end of the second round of the SISs, the slight growth in interaction performance was not significantly different from each other. It should, however, be noted here that the minor upward curve in interaction performance observed for the use of blocked practice recorded in the initial phases of the SISs continued to show in the final phases. Emphasizing similar findings about the positive effect of blocking on L2 learning observed in some studies in the past [e.g.,49-51], it might be stated that the advantages of blocking in the enhancement of interaction performance could also be registered in the present study in the later phases of L2 practice.

The progression of interaction performance of the participants in both groups did not demonstrate any significant difference during the three rounds of SISs. Both the minor downward and upward curves in the progression of interaction performance observed at different stages of the SISs were similar for both groups. The small spike observed in favour of blocking in the initial phases of the SISs, even though not statistically significant, might be caused by the effect of desirable difficulty observed in similar cases in the past [e.g., 56, 45, 46]. The effect of a desirable difficulty framework requires items for learning to be presented at the appropriate level of proficiency. As per the understanding of this effect on L2 learning,

the use of interleaving might be inappropriate for learners with low language proficiency. Since interleaving involves a greater amount of practice with an increased level of contextual interference, it has been considered appropriate for learners with high proficiency [45, 46]. In L2 learning situations involving learners with low proficiency, the use of blocking might be appropriate as it reduces performance stress in beginners [33]. The slightly upward curve in the interaction performance of the participants using blocked practice in all three tests administered in the study might be on account of low difficulty level and stress reduction [33, 52] experienced by the group during the SISs.

Additionally, the absence of any significant growth in the interaction performance of the participants in both groups during the three rounds of SISs might also be explained as the result of the quality of L2 teaching. The online oral practices conducted during the SISs failed to establish motivated and engaging communication between the learners and the teachers. It might have influenced the perception of the learners towards the teaching sessions and rendered them devoid of pedagogical seriousness. It may be noted here that teaching sessions with more involvement and urgency might have led to a significant rise in interaction performance in favour of blocking, instead of a minor upward curve registered in the present study.

4. Conclusions

The present study was an experiment on the pedagogical effect of interleaving and blocking on English interaction performance. The study did not observe any significant difference in the effect of interleaving and blocking on the interaction performance of English L2 learners. Neither group performed significantly better than the other in the initial stage of learning. Even though a slightly better interaction performance was observed in blocking, it was not substantial enough to be of any statistical significance. The study also did not register any significantly different results in the interaction performance of the two groups in the concluding stages of the SISs. The trend of minor spikes for blocking observed in the initial stages of learning continued in the final stages. The most important understanding of the study was that interleaving might not be as effective as blocking in the enhancement of interaction performance in L2. Since the effect of desirable difficulty creates stress in interleaving in the initial performance of learners with low language proficiency [45, 46, 52], blocking may prove to be more effective than interleaving in the enhancement of interaction performance in L2.

Several pedagogical implications may be drawn from the study. First, the predictable order of sequencing items for learning according to the level of difficulty might be more effective in the enhancement of interaction performance in L2 than the mixing technique in interleaving. Second, an attempt at the production of an element of novelty and surprise by breaking the predictable order of learning items might not prove successful in situations of L2 learning that require noticing and retrieval of common features among stimuli than the identification of discriminative contrast [e.g., 49-51, 55]. Third, L2 practices for the enhancement of interaction performance might do well to attempt the reduction of stress in the initial training sessions so that the effect of desirable difficulty might be appropriate for the L2 learners' level of proficiency.

There were some limitations in the present study, and they were interrelated. First, the SISs were conducted online and consequently, the benefits of interpersonal connection between the teacher and the learners proved difficult to achieve. Because of the restrictions in online

communication, the factor of motivation was missing among the learners in both groups. Moreover, the infrastructural issues of electricity and internet network during the SISs created repeated disturbances in the middle of the sessions. Second, the teachers found it difficult to create an element of interest in the sessions. They could not even ascertain whether the learners were continuously present during the sessions or not. Additionally, the lack of interpersonal communication between the teacher and the learners in the online mode might also have led to some dropouts during the three rounds of SISs. It may finally be stated that conclusive and more comprehensive observations on the effect of interleaving and blocking on interaction performance in L2 might be achieved in a more focused study using a face-to-face mode of interaction than the online mode used in the present study.

Multidisciplinary Domains

"This research covers the domains: (a) South-East Asian Studies, (b) Social Science, (c) Technology."

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Conflicts of Interest

The author declares no conflict of interest.

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